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The Canadian Engineer

ESTABLISHED 1893.

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Index of this issue will be found on page 567.

THE FIRST ANNUAL REPORT OF THE CANADIAN COMMISSION ON CONSERVATION.

We have just received the first annual report of the Commission on Conservation, Canada. The establishing of this Commission was a departure from the regular routine of Government affairs that will be much appreciated by the Canadian people.

Under our system of government, with matters of State responsibility divided between Provincial and Dominion authorities, it is but natural to expect that frequently different sections of Canada would be working against each other in the development and preservation and conservation of her natural resources.

The establishing of the Commission forms the central body, which will be able to secure the co-operation of the different Provincial bodies in matters that affect more than one Province, and in matters that the several Provinces have an interest, but only the Dominion has the control.

The tenth clause of the Act establishing this Commission says:—

> It shall be the duty of the Commission to take into consideration all questions which may be brought to its notice relating to the conservation and better utilization of the natural resources of Canada; to make such inventories, collect and disseminate such information, conduct such investigations inside and outside of Canada, and frame such recommendations as seem conducive to the accomplishments to that end.

Although the work of the Commission will be largely educational, yet their direct influence on legislation has been already very marked. At the sessions of both Provincial and Dominion Parliaments, recently closed, the influence of the Commission has been in evidence in several discussions, and more than one measure has been either dropped or largely modified because of the information, evidence and pressure brought to bear upon the members of the House by the Commission.

This first annual report contains the speeches of an eminent scientist, who addressed the Commission at the convention held in Ottawa last January, and also embodies the programme of work which each of the committees of the Commission have laid out for themselves. It will be found to be a valuable addition to the library of those interested in scientific matters, in the present development of Canada, and in the possibilities of the country.

Now that the Government has undertaken this work, we look to the growth of the work and the Commission, and shortly to the enlargements of its powers and functions, with increased grants, making possible the investigation along lines similar to those carried out by the Government Testing Laboratories of the Smithsonian Institute at Washington.

EXHIBITORS AND EXHIBITIONS.

Already we are commencing to anticipate the exhibition spirit, which will soon be manifest from one end of the country to the other. There never were so many opportunities offered for the display of machinery and all classes of engineering manufactures as there now are. From Halifax to Victoria, every city and town has its exhibition, lasting from two days to two weeks. A few years ago manufacturers made special effort to have large displays at these exhibitions, and just now the leading firms are again vieing with one another in the largeness and completeness of their displays.

Development and improvement have taken place in all countries, and the engineer takes the opportunity afforded at these exhibitions to familiarize himself with the machinery displays that come from some distance. It also affords him an opportunity to compare the product of different firms and to become acquainted with the men who are the spirit of the business which they are conducting.

Competition is becoming keen, and with the increased competition a desire for publicity. For this, these exhibitions offer splendid opportunity.

To trace direct results from displays at the largest exhibitions may sometimes be difficult, and it is not to be wondered at that manufacturers hesitate spending several thousand dollars when in the past they have not been able to trace direct results. Still, experience has shown that to neglect, for one year, proper publicity will cause a large decrease in inquiries and subsequent sales.

The exhibition managers should do everything they can to assist and encourage machinery exhibits, for they are something every sightseer is interested in. The manufacturers who exhibit will find that this kind of publicity is as effective as he could wish.

EDITORIAL NOTES.

Many of the citizens of Toronto are disgusted with the dock arrangements and dock facilities afforded by Toronto harbor. The arrival of the "Keystorm" and the primitive methods being adopted to unload her is an example of the lack of facilities for steamship transportation at that port. Time and again the City Engineer and the Dominion Government Resident Engineer have submitted detailed plans for harbor improvement. Time and again the council have shelved these reports. The municipality is now reaping the fruits of their folly in not providing for the city's future requirements.

* * * *

Elsewhere in this journal will be found a complete review of the report on the Lindsay ozone water purification plant. This report has been issued by Dr. Charles A. Hodgetts, secretary of the Provincial Board of Health, Parliament Buildings, Toronto. In a couple of weeks the secretary will be in a position to furnish a limited number of copies to those interested in water purification.

* * * *

For some time past there has been a difference of opinion between the power companies of Niagara Falls and the Queen Victoria Niagara Falls Park Commissioners as to the proper method to be adopted for payment of power generated in excess of the amount stated in the agreement with the companies, the companies wishing to pay by the average load, the Commissioners wishing to receive pay as per the peak load. By the 1st of November, 1909, the C.N.P. Co. were owing, by the average load method, some $56,765, but by the peak load they would be owing $83,101. The Ontario Power Co.'s figures are $10,323 and $23,717, and the Electric Div. Co.'s, up to August 1st, 1909, were $8,157 and $39,875.

* * * *

A circular of May 16th from a United States metals house says: "Although the American public can spend hundreds of millions of dollars for automobiles, we seem to be unable to finance our own railroads, and have to go abroad for new capital. This is equivalent to mortgaging our properties to Europe in order to continue our present extravagance and to maintain our commodity prices at a point which is out of touch with the rest of the world. The figures for April showed that our balance of trade is getting worse rather than improving; and, like the man who lives beyond his income, or too close to it, we find that we are increasing the business of the merchants we patronize, but probably have to ask accommodation from our banker. It is useless to disguise the fact that, after eight months of record-breaking consumption and production of almost all products, we have already entered into a stage of reduced operations. The best guide we have, which is the iron and steel trade, clearly points this out to us."

WATERPROOFING AND CONCRETE

One section of the sewers of Louisville, Ky., was very close to Bear Grass Creek. In view of this fact, considerable attention was given to the study of waterproofing compound, and H. P. Eddy, in his report to the commissioners of sewage of Louisville, describes the method of waterproofing and results of tests made upon various kinds of mixtures. In addition to the test as to seepage, similar material was subjected to a tensile stretch, and table 2 gives the results of these tests.

The method used for determining the permeability of different concretes was similar to that employed in the Government Laboratory for testing structural materials, located at St. Louis. Specimens of concrete were made ten inches in diameter and four inches thick. These blocks were placed between iron castings, bolted firmly together in such a way as to allow the application of water under different pressures to a surface six inches in diameter. In order to provide water at definite pressure, an air-tight iron tank containing filtered water was connected with another tank containing compressed air. The pressure was communicated from the air tank to the surface of the water in the other tank from which pipes properly controlled by valves conducted the water to the specimen.

In table 1 are given the amount of seepage through the different specimens examined.

These tests were made upon concrete, the constituent parts of which were so proportioned as to form a theoretically perfectly graded mixture; concrete—one part cement, two parts Ohio River sand and four parts Ohio River gravel; concrete—1:2:4—to which various commercial waterproofing compounds were added; and concrete in which a portion of the Ohio River sand was replaced by a equal portion of very fine sand and clay. Where hydrated lime, Medusa, Maumee and Toxement were used the amount added was a definite proportion of the quantity of cement used, but the quantity of cement was not reduced. The McCormick compound was furnished already mixed with cement and was said to have been mixed at the time of grinding. The Ceresit

was substituted for a portion of the water and in the proportion of one to twenty.

TABLE 1.

RESULTS OF TESTS OF METHODS OF WATERPROOFING CONCRETE

(Pressure, 15 pounds per square inch.)

Specimen.	Seepage (Duration of test-7 hours.) Cu. Inches per Sq. Inch.	Cu. Centimtrs. per Sq. Centimtr.	Gals. per Sq. Ft.	T'l Seepage in Cu. Centimts.
Perfect Mixture	1.53	3.99	3.22	721
Concrete (1-2-4)	6.30	16.6	13.85	3,000
Concrete with Clay-5%	0.85	2.20	1.78	398
Clay-10%	0.12	0.31	0.25	56
Concrete with Fine Sand- 5%	4.86	12.65	10.21	2,290
Fine Sand-10%	1.20	3.12	2.51	565
Concrete with Hydrated Lime- 4% ..	0.71	1.83	1.48	332
Hydrated Lime- 6% ..	0.24	0.62	0.50	112
Hydrated Lime- 8% ..	0.10	0.27	0.22	49
Concrete with Medusa- 2%	0.92	2.49	2.01	450
Medusa- 4%	0.	0.	0.	0.
Concrete with Maumee- 4%	0.23	0.61	0.49	110
Concrete with McCormick	0.17	0.44	0.36	80
Concrete with Ceresit	1.98	5.03	4.22	928
Concrete with Toxement- 4%	0.	0.	0.	0.

The dry waterproofing compounds and the hydrated lime were added to and thoroughly mixed with the cement before wetting. The tests covered by table 1 were all carried out with a pressure of water of slightly over fifteen pounds per square inch and for a period of seven hours. Care was taken to avoid error due to evaporation.

Further tests showed that the quantity of seepage was approximately proportional to the pressure applied and that there was no material cessation after an application of pressure for eighteen hours.

TABLE 2.

Results of Tests to Determine Effect of Waterproofing Materials upon the Tensile Strength of Neat and Mortar (1:3) Briquettes.

Waterproofing materials added.	How added.	Per Cent. added.	Tensile Strength Neat 7 dys.	Neat 28 dys.	Mortar 1-3 7 dys.	Mortar 1-3 28 dys.
McCormick "A" from St. Louis.	Combined with cement at mill	...	797	740	205	307
McCormick "B" Local	Combined with cement at mill	...	513	577	199	220
Ceresit	In place of water	5	642	669	311	375
Moulding Sand...	In place of sand*	5	698	743	176	368
Moulding Sand...	In place of sand	10	636	642	177	510
Hydrated Lime...	Added directly ..	5	749	651	387	511
Hydrated Lime...	To dry cement...	10	608	635	371	505
Clay.....	In place of sand*	2.5	753	737	235	344
Clay.....	In place of sand	5.0	718	912	221	401
Clay.....	In place of sand	7.5	644	802	344	327

*In the case of the neat briquettes the amount of sand and clay added were percentages of the dry cement.

Tests were made to ascertain if the addition of the several waterproofing materials in varying amounts reduced the tensile strength of neat and 1:3 mortar briquettes. The results of this study are given in table 2.

As a result of these investigations, concrete to be used in wet localities has been made by the substitution of 10 per cent. of the regular (Ohio River) sand by a like amount of fine moulding sand containing some clay. The first test of this mixture was in the reconstruction of a fire cistern in private property. This cistern was filled with water soon after its completion and the leakage was so slight, if there was any at all, that after a period of forty-eight hours, there was no perceptible reduction in the height of the water in the neck of the cistern, twenty-one inches in diameter. The cistern was ten feet in diameter and contained a depth of thirteen feet of water. Since this test several sewers have been built of concrete made in this way with uniformly satisfactory results, so far as it has as yet been possible to test the structures.

ASPHALT PAVEMENT THICKNESS AND GUARANTY PERIOD*

By J. W. Howard, Consulting Engineer.

City officials, taxpayers and bonding companies are all directly and financially interested to see that pavements are laid of good quality and full thickness. The entire public, which uses streets in one way or another every day is directly and indirectly put to a loss and inconvenience, when an asphalt or other pavement is of poor quality or of less thickness than it should be.

Efforts have lately been made by either the open or secret agents of a few asphalt contractors to have the thickness of the asphalt pavement wearing surface and of the binder reduced. This effort has been made since the practically united action of the bonding companies to refuse to furnish guaranty bonds for the quality or maintenance of an asphalt pavement for longer than a period of five years. The reduction of the thickness of an asphalt pavement surface, when first constructed, to less than two inches and of the binder to less than one and one-half inches, to depart from that which is the best practice in regard to durability and subsequent economy.

Since the report on the "Use and Abuse of Pavement Guarantees," reprinted in pamphlet form, supplied on demand by the writer, there is every evidence that city engineers, taxpayers and bonding companies practically agree with the following statement made in that report: "A guaranty bond takes a pavement from the control of the engineering department and puts it for a long period as a burden on the legal department of a city which is an unsatisfactory, slow and uncertain way to convert a poor pavement into a good one, and it is not for the interests of cities to require guarantees beyond such a period as will bring out defects due to neglect or accident and that such defects appear within one or two years. Two years are sufficient to demonstrate the quality of a pavement laid under inspection of a competent man in any city. Taxpayers wish a good pavement on a street and not a bond in a city hall."

The quality and thickness of an asphalt or other pavement, from the standpoints of municipal engineers or others who design it and inspect its construction, and those who pay for the pavement, should not be influenced by a guaranty or absence of guaranty. Pavements must be laid of full

*From a paper read before the American Society for Municipal Improvements.

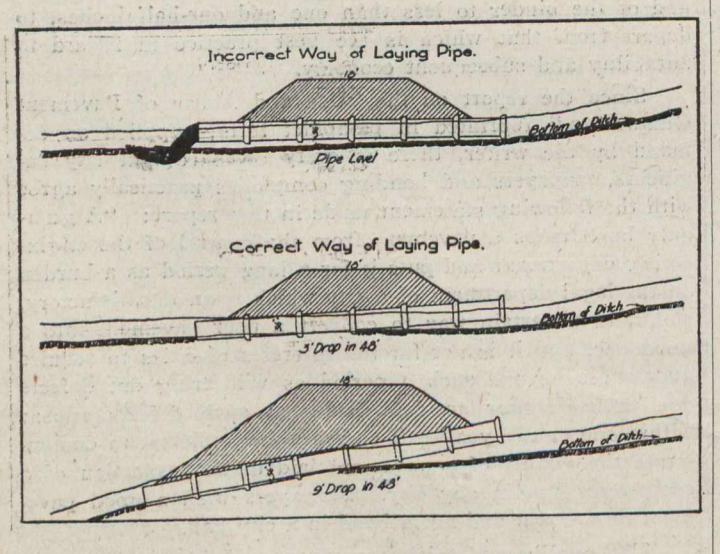
thickness and good quality under municipal engineering inspection, whether guaranteed or not. Water and sewer pipes as well as other municipal construction and buildings are undertaken and finished and accepted, without a time guaranty. Better, more durable and more economic construction is attained and the proper municipal engineers and local officials can be held responsible. A past monopoly of asphalt supply and a desire to introduce asphalt pavements when engineering knowledge of them was not as common to all engineers or easily obtainable as at present, was the cause of the introduction of pavement guarantees. These are now no longer needed. Engineering knowledge of asphalt and other pavements is almost general and experts are available. There are at least 16 different independent and competing sources of supply of good American and foreign refined asphalts or asphalt cements.

In order to fully determine the facts referred to and the opinion that an asphalt pavement wearing surface 2 inches thick laid upon a binder of 1½ inches thickness, guaranteed for five or less years, is to be preferred to an asphalt wearing surface of less thickness guaranteed for even ten years, I sent a circular letter, with suitable questions, to the city engineers of many cities. The condensed opinions of the city engineers from the following cities are examples of the answers received from practically all, and are in accord with the conclusions reached.

LAYING OF CULVERT PIPE.*

By C. H. Bremner.

A common way of laying culverts is to put the culvert in the bank with the upper end about level with the bed of the stream and the lower end nearly to the surface of the ground. Sometimes this gives a fall, but not to a sufficient amount. The culvert should ordinarily be laid in the bank and not in the bed of the stream, but the upper end of the pipe should be at high above the bed of the stream as it is



safe to raise it, while the lower end should be below the bed of the stream, say, 6 in. to 2 ft., depending upon the diameter of the pipe and surrounding circumstances, thus getting as great a fall in the pipe as is possible in each location. The accompanying sketch figures show the right and wrong ways of laying the pipe. In some tests made during the past few years we have had a chance to note the different effect of the two methods. With pipe laid level or nearly so, there is a waterfall effect at the lower end which has a tendency in times of flood to scour out a large hole at the base of the bank, and there have been cases where our banks have been injured and also where we have had to pay for damages to adjacent farm land, which would have been avoided if the pipes had been properly laid. If laid with a steeper slope than the bed of the stream, pipes and culverts will not clog up so readily, but will better keep themselves scoured clean from debris and sand, as there will be a greater velocity in the flow through the pipe, and not the tendency to deposit material which we so often see filling up our openings.

We also can use smaller openings if pipes and culverts are given the proper fall, for they will carry away the water much more rapidly.

Table Showing Comparative Discharge, 36-inch Pipe, 48 Feet Long. Cubic Feet per Minute.

	Laid Level.	6″ Fall.	3′ Fall.	6′ Fall.	9′ Fall.
Pipe running full	2,910	3,518	6,151	9,251	10,990
Head 1 ft. over top of pipe	4,276	4,988	7,957	9,663	11,340
Head 3 ft. over pipe	6,151	6,588	9,251	10,999	12,390

The foregoing table of relative discharges under varying conditions shows that a 3-ft. pipe, 48 ft. long, having a fall of 6 ft. will carry 3.1 times as much water as it would if laid level when the pipe is running full. When there is a head of 3 ft. above the top of the pipe it will carry 1.8 times as much as when laid level, or 3.7 times as much as it will when laid level and only running full. This gain in carrying capacity is applicable to boxes and culverts as well as to pipes, and it is worth while to make a study of each case, in order to get as much fall as possible, under the track, in order that the smallest opening can be used, which will handle the water without danger or damage.

*In Bulletin No. 108 of the American Railway Engineering and Maintenance of Way Association.

NEW INVENTIONS.

The following Canadian patents have been recently secured through the agency of Messrs. Marion & Marion, Patent Attorneys, Montreal, Canada, and Washington, D.C.

Any information on the subject will be supplied free of charge by applying to the above named firm.

125164—Rudolf Ruth, Charlottenburg, Germany, Photographic sensitive plates or films.

125229—Auguste Denereaz, Montreux, Switzerland, Sockets and plugs for Electric Lamps.

125238—John W. Burleigh, Taunton, England, Dynamo Electric Machine.

125249—R. A. McDonald & W. T. Cann, North Sydney, C.B., Orange Peeler.

125251—H. Diamanti & C. Lambert, Paris, France, Apparatus for recovering vapors issued from volatile liquids.

125271—Michael Bohn, Nagykikinda, Hungary, Machine for Cleaning and Sorting Clay.

125304—Karl A. F. Hiorth, Christiania, Norway, Method of Reducing Ores.

125315—Etienne W. Kuhn, London, Eng., Manufacture of Grape Beer.

THE

Sanitary Review

SEWERAGE, SEWAGE DISPOSAL, WATER SUPPLY AND WATER PURIFICATION

LINDSAY'S WATER SUPPLY AND OZONE PURIFICATION.

The Sanitary Review has consistently maintained a policy of caution in coming to any conclusion on the alleged efficiency of the Lindsay ozone plant.

In articles published in our issues of July 23rd, 1909, and August 27th, 1909, we felt compelled to strongly condemn the action of the town council in accepting the plant as satisfactory on the strength of a report made not by the Provincial Board of Health, but by an unofficial bacteriologist.

In no sense did we wish to make any imputation with reference to the bona fides or ability of this bacteriologist, but we felt that the gentleman had neither the time, opportunity nor means of thoroughly testing the plant, in order to provide a certificate of clearance on behalf of the contractors.

The position which we then took caused us to be somewhat roughly handled in communications from Mr. Bridge and in published matter in the local Lindsay papers; in fact, we were accused of prejudice and other like unworthy motives.

In view of the report which has been issued by the Ontario Government, and which is dealt with in this issue, we may be pardoned for now quoting some of our past statements and comparing them with the findings of the Provincial Board of Health as a justification of the policy we have maintained:—

Sanitary Review Section of the Canadian Engineer.

July 23rd, 1909.

"A private report and analysis tests have been obtained apart from the Provincial Board of Health. These we publish in this issue. The town council evidently are content. We cannot enthuse over these results to the extent either of the town council or the local papers. As far as the town of Lindsay is concerned, we cannot yet accept its ozone treatment as satisfactory.

"From the above (viz., a percentage reduction based on the private analysis) it will be at once seen that filtration has proved a more efficient means of bacterial removal than ozone."

The total removal of bacteria is far below the percentage required either by mechanical or slow sand filtration viz., 97 and 99 per cent., respectively.

August 27th, 1909.

The local Lindsay papers have gone into hysterics over the wonderful work and efficiency of the plant. It is stated that most impure water is rendered pure by ozone to a degree never rendered by any other method. These conclusions have been advertised by other papers, with the result that an altogether false impression has got abroad with reference to this, the first installment of ozone water purification in Canada.

While we feel that the retort of "I told you so" has only an aggravating effect, and is of little practical value to those directly concerned, yet other municipalities should learn something from the history of this Lindsay transaction.

We have over and over again pointed out the folly of municipalities engaging the patent vendor as their expert adviser. May we again quote from these columns of our issue of October 22nd, 1909:—

"The business man comes along with a distribution of pamphlets and a vocabulary of ready-made science. His goods may or may not be the very best in the market. But who shall judge? Shall the municipality judge? The people who are not in a position to compare the goods with any others in the market just

Provincial Board of Health Report.

Feb. 8th, 1910.

"I deem it necessary to draw attention to the absolute diversity of our results and those of the report on which the system was accepted by the town. Six months ago colon bacilli were destroyed by the ozone every time; during our test, not at all. The problem might well be worth investigating by the Water Commissioners of Lindsay.

"The filters remove 30 per cent. of the bacteria and the ozonizers 8 per cent."

The total bacterial removal by both filters and ozone gives a reduction of only 35.78 per cent.

The Government report does not hesitate to say that "the system is an absolute failure, as far as purifying the water is concerned."

"The system would achieve practically the same results with the ozonizers shut off or removed.

"From the analysis it will be seen that ozone has done absolutely nothing, not even removing the color in the slightest degree."

take for Gospel all that the pamphlets say, pay the price and save the fees otherwise due to the sanitary engineer for independent advice."

Lindsay is saddled with an ozone plant which is not an ozone plant, and which at the best consists of two rough filters, defective and leaking in their constructional features, allowing of surface contamination. Even the filters themselves are but an absurd apology, with a bacterial removal of only 30 per cent., whereas ordinary roughing filters should remove from 40 to 50 per cent. of the bacteria.

Ozone may or may not be a practical method of disinfecting water. We certainly are of opinion that in practical efficiency it is far below other recognized methods, but the method by which it has been boosted in Canada at the expense of, and in comparison with, other well-known systems of water purification, coupled with its total failure at Lindsay to provide any apparent results, has put back the question of ozone treatment in Canada for many years.

REPORT ON THE LINDSAY OZONE WATER PURIFICATION PLANT.

By The Provincial Board of Health of Ontario.

This report just published by the Provincial Government of Ontario has been anxiously awaited by many interested in the question of purification of water by ozone.

The report deals purely with scientific data based on exhaustive tests made on the site of the works; the investigations cover a period from September 7th, 1909, to February 1st, 1910, or practically five months. A temporary laboratory was provided at the works, Dr. Nasmith having charge of the general and chemical investigations, and D. Philp, of the bacteriological.

The system of applying ozone to the water at Lindsay is that known as the "Howard-Bridge" system. The principal

Interior of the Ontario Board of Health—Testing Laboratory in Lindsay.

feature claimed consists in an automatic method of drawing the ozone into connection with the water by means of aspirators. It has been claimed that the Howard-Bridge system practically constituted a revolution in methods of applying ozone to water.

The disinfecting or sterilizing qualities of ozone have been under investigation in Europe for many years, and their efficiency in this respect fully acknowledged. The difficulty, however, has always been, as far as water sterilization is concerned, in bringing the ozone into contact with every drop of water, this difficulty is increased because ozone is comparatively insoluble in water. Several mechanical devices are employed in order to provide intimate contact between the gas and the water. Such well-known systems as the Siemens Halske and the De Fries have been more or less successful, but the heavy expense of ensuring efficient contact has been universally acknowledged as the main drawback to ozone purification methods in practice. **For instance, at St. Maur, Paris, it costs more to force contact between the ozone and the water than to make the ozone.**

Naturally, when Mr. J. H. Bridge introduced his method into this country, with guarantees of great promise and optimistic predictions of reduced cost and high efficiency results, much interest in **the method was aroused.** And, even in some quarters, enthusiasm was aroused. When it was found that the town of Lindsay, Ont., had decided to install the Howard-Bridge system in connection with its water supply, on the commercial basis of "no cure no pay," it was felt that the system was on its trial in Canada.

Naturally, now, there is very keen disappointment felt in many quarters that Dr. Nasmith, on evidence, has been bound to state as follows:

"From the evidence obtained by us I do not hesitate to say that the Howard-Bridge system, as installed at Lindsay, is an absolute failure, as far as purifying the water is concerned. From the mechanical standpoint of the means for carrying to and mixing the ozone with the water, it is defective in every particular.

"The system would achieve practically the same results with the ozonizers shut off or reversed."

Resumé of Report

The original agreement between the town and Mr. J. H. Bridge calls for a water which shall have all taste, odor, color, and harmful bacteria removed.

The water of Lindsay is obtained from the Scugog River. The river banks are low and marshy, the river bed itself is full of weeds and expands in places to include large areas of drowned lands with the usual accompaniment of fallen trees and partly submerged stumps.

The banks of the river are bordered by farms, and a considerable number of houses and barns may be seen from the river.

The proximity of the farms with their barnyards, manured fields and cattle, will readily account for the supply of colon bacilli constantly found present in the water.

As one would expect, the water contains large amounts of dissolved organic matter, derived from decaying wood, weeds and other vegetable and animal life; it is highly colored, contains much visible organic debris and usually tastes "weedy." As one would expect, the bacterial and protozoan flora is quite varied.

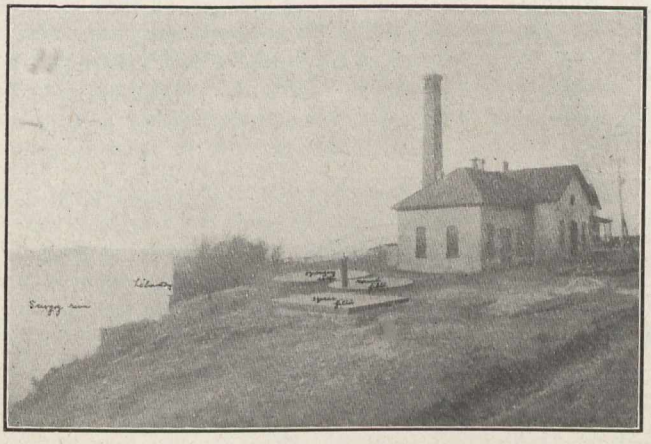
The Howard-Bridge plant consists of two parts: 1, the filters, two in number, which remove the suspended matters

and some of the bacteria from the water, and 2, the ozonizing section for generating and applying ozone to the filtered water.

The filters are of the type called rough mechanical filters. No coagulants are used in connection with these filters.

These two units filter about half a million gallons of water per day.

The water runs by gravity from the river into the filters, upon which a head of from one and a half to three feet is maintained, the head depending upon the level of the river. The filtered water is received through Irwin patent sand valves, which seemed to have worked very satisfactorily, into pipes which carry it into the filtered water chamber. Here the water flows through the aspirators and is supposed to entangle a sufficient amount of ozone to purify itself.



B.—General View of the Lindsay Plant Looking Up the River Towards Scugog Lake.

The apparatus for generating and delivering the ozone is situated in the pumphouse. In the transformer room there is a blower which is supposed to draw the air from outside and blow it through the ozonizers, two in number, placed in an adjoining air-tight compartment. The current is received at 110 volts and is transformed to 8,000 and 10,000 volts. This current passing through the ozonizer in the form of the "Silent Discharge" transforms the oxygen of the air into the active form of ozone. From this room the ozonized air is led by a six-inch pipe to the aspirators, eight in number, through which the filtered water is flowing.

The falling water entangling this ozone carries it down to the bottom of a well, 22 feet deep, and then flows backwards and forwards through a box containing baffles of perforated plates, to the surface of the well. In this travelling together for about 85 feet the ozone is supposed to part with its active atom and destroy the organic matter, including the bacteria, in the water. The water is then pumped from this receiving well into the town mains and stand-pipe.

The gas generated is without doubt ozone and answers to all the ordinary tests.

The action of the ozone and filters on the water should be clearly shown by the physical and chemical changes produced in it. Samples were taken from the raw river water as it came into the filters, from the filtered water well, from the ozonized water well and from the town supply, usually from the hotel tap, and analyzed. The following table speaks for themselves.

Average Composition of 7 Series of Lindsay Waters, Parts per Million.

Specimen	Free NH_3.	Albuminoid NH_3.	Nitrites and Nitrates.	Total solids.	Total hardness.	Temporary hardness.	Permanent hardness.	Oxygen consumed.	Color (true).	Chlorine.
Raw	.022	.238	.129	.0212	195	140	55	5.6	25	1.5
Filtered .	.023	.227	.194	.0212	200	142	58	5.7	25	1.5
Ozonized.	.023	.228	.163	.021	206	140	66	5.6	25	1.5
Tap	.018	.224	.190	.024	202	140	62	5.0	25	1.5

SUMMARY OF FERMENTATION REACTIONS,

Showing number of Positive and Negative Fermentations and Colon Reactions in each of the quantities of the several waters tested.

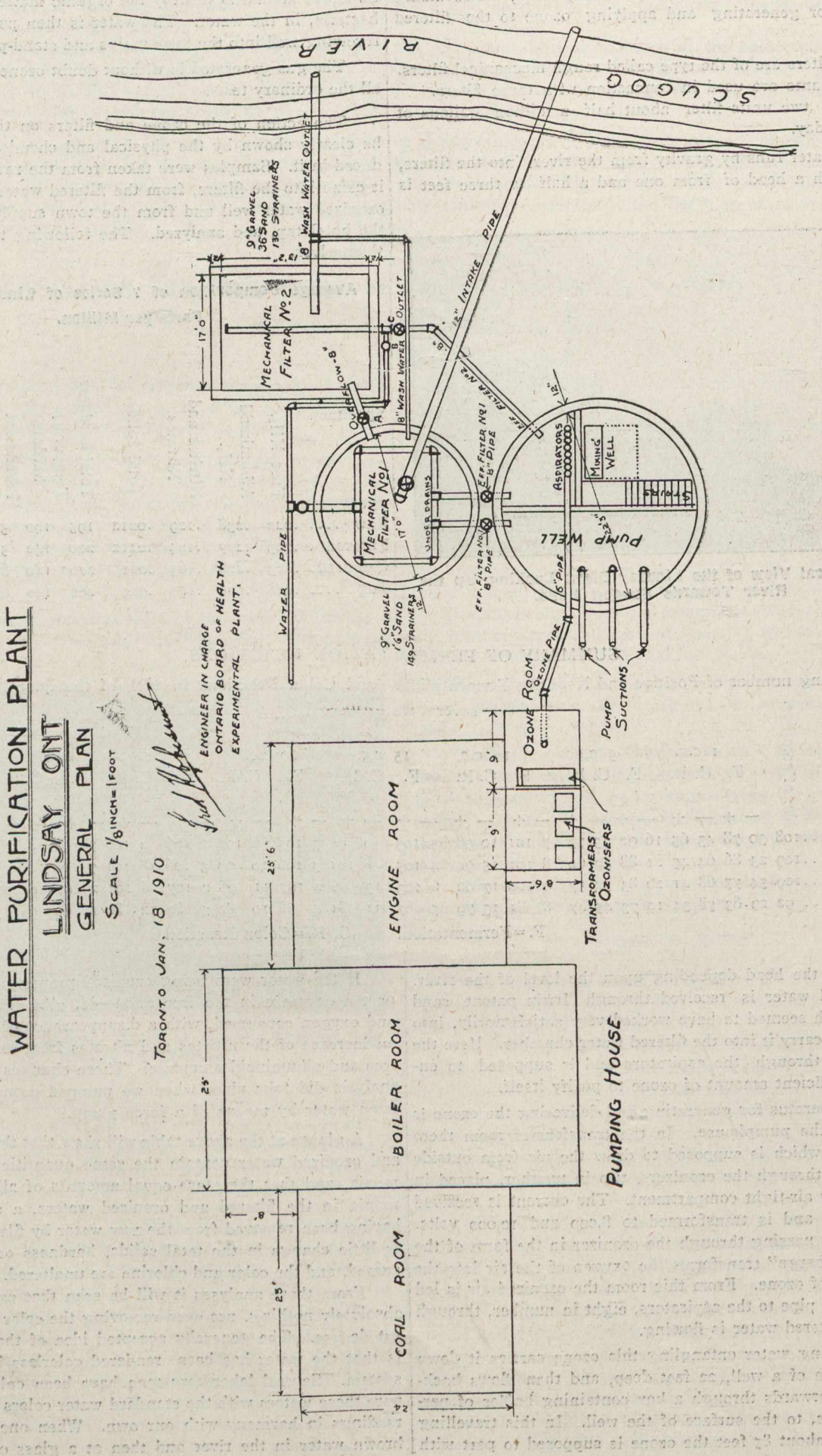
Water.	No. of samples.	1 c.c.			5 c.c.			10 c.c.			15 c.c.			20 c.c.			30 c.c.			40 c.c.			50 c.c.		
		F.	C.	R.	F.	C.	R.	F.	C.	R.	F.	C.	R.	F.	C.	R.	F.	C.	R.	F.	C.	R.	F.	C.	R.
		−	+		−	+		−	+		−	+		−	+		−	+		−	+		−	+	
Raw	108	30	78	43	65	16	92	35	73	7	101	10	98	5	103	9	99	3	105	6	102	2	106	2	106
		3	105	4	104	1	107	3	105																
Filtered ...	109	23	86	64	45	21	88	49	60	8	101	15	94	4	105	8	101	3	106	10	99	3	106	8	101
		7	102	12	97	2	107	9	100																
Ozonized ..	109	34	75	68	41	26	83	52	57	9	100	17	92	6	103	13	96	2	107	11	98	2	107	8	101
		2	107	10	99	2	107	10	99																
Tap	92	29	63	58	34	19	73	45	47	8	84	13	79	5	87	11	81	4	88	10	82	3	89	12	80
		2	90	9	83	1	91	5	87																

F. = Fermentation. C. R. = Colon Reaction.

If the water were being ozonized properly one would expect a decrease in the free ammonia, albuminoid ammonia and oxygen consumed, with a disappearance of the color and an increase of the nitrites and nitrates from oxidation of the free and albuminoid ammonia. These changes we proved by analysis did take place when we pumped ozone through the town water by means of a force pump.

A glance at the above table will show that the raw, filtered and ozonized water contain the same quantities of free ammonia, and that there are equal amounts of albuminoid ammonia in the filtered and ozonized waters, a small amount having been removed from the raw water by filtration. There is little change in the total solids, hardness or oxygen consumed, and the color and chlorine are unaltered.

From these analyses it will be seen that ozone has done absolutely nothing, not even removing the color in the slightest degree. The generally accepted idea of the townspeople is that the water has been rendered colorless by their new system. Several laboratory men have been enlisted to compare these waters with the standard water colors and all made readings in harmony with our own. When one looks at the brown water in the river and then at a glass of water from


WATER PURIFICATION PLANT
LINDSAY ONT
GENERAL PLAN
SCALE 1/8 INCH = 1 FOOT
TORONTO JAN. 18 1910
ENGINEER IN CHARGE
ONTARIO BOARD OF HEALTH
EXPERIMENTAL PLANT.
RIVER
SCUGOG
9" GRAVEL
3" SAND
130 STRAINERS
8" WASH WATER OUTLET
MECHANICAL FILTER No. 2
17'0"
OVERFLOW-8"
WASH WATER
OUTLET
12" INTAKE PIPE
EFF. FILTER No. 2 8" PIPE
MECHANICAL FILTER No. 1
17'0"
UNDER DRAINS
WATER PIPE
9" GRAVEL
6" SAND
149 STRAINERS
EFF. FILTER No. 1 8" PIPE
ASPIRATORS
MIXING WELL
STEPS
PUMP WELL
6" PIPE
OZONE PIPE
PUMP SUCTIONS
OZONE ROOM
TRANSFORMERS
OZONISERS
ENGINE ROOM
25'6"
9'
9'
9'6"
BOILER ROOM
25'
COAL ROOM
25'
8'
24'
PUMPING HOUSE

the tap, the latter appears colorless. Two long colorless glass tubes containing the filtered water before and after it had been ozonized could not be distinguished apart. The first thing that ozone does to a colored water is to render it colorless; this the Howard-Bridge system has absolutely failed to accomplish, a simple observation which may be made by anybody.

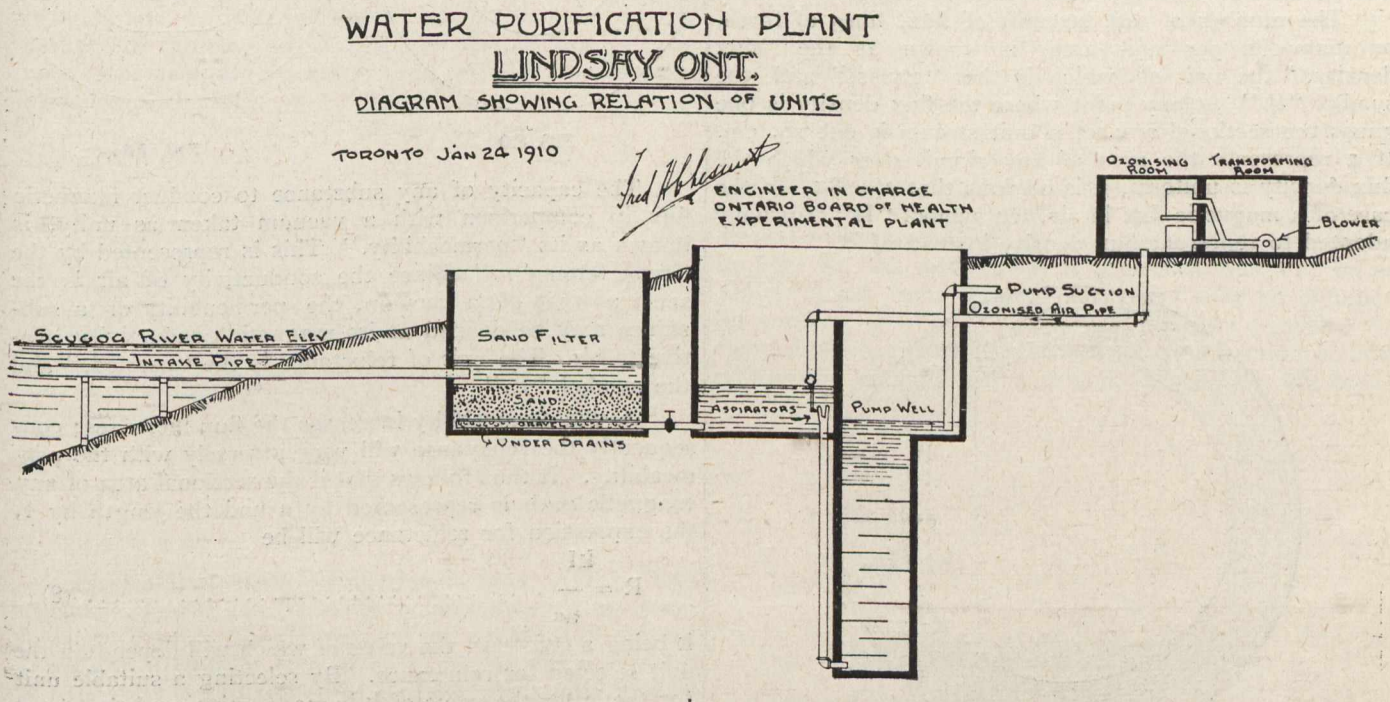
As it seems to be generally conceded that one cubic metre of water with a low content of organic matter will need at least half a cubic metre of ozone, with a concentration of one-half to one gram of ozone per cubic metre, to purify it, and as it did not seem to me that this quantity could be going into the water, judging from the ebullition on the surface of the ozonizing well, I had a T pipe put in the ozone pipe four feet above the aspirators and tried to measure the flow by a standardized anemometer, at the same time aspirating off samples in order to estimate the strength of ozone.

If 500,000 gallons of water per day are flowing through the aspirators with ten hours of pumping then 250,000 gallons of ozonized air per day, or 25,000 gallons per hour, should be drawn through them. This would mean a flow of air at the rate of 340 feet per minute through the six-inch pipe.

2. Leaking of the walls of the square filter.
3. Insufficient sand on the round filter.
4. No means for drying the air to be ozonized.
5. Lack of power in the blower.
6. No means for distributing the air evenly through the plates of the ozonizers.
7. Failure of the aspirators to draw into the water any but traces of the ozone produced; as shown by
   (a) No physical changes in the ozonized water.
   (b) No chemical changes in the ozonized water.
   (c) Very slight bacterial reduction in the ozonized water.

From the evidence obtained by us I do not hesitate to say that the Howard-Bridge system, as installed at Lindsay, is an absolute failure, as far as purifying the water is concerned. From the mechanical standpoint of the means for carrying to and mixing the ozone with the water it is defective in every particular.

With the knowledge that the ozone does not get into the water the bacterial and chemical results are self-evident, or from the reverse standpoint the bacterial and chemical results are an absolute indication that the ozone is not getting into the water.



As a matter of fact, the movement of air in the pipe was so slight that the anemometer would not turn at all, though the draught passing through the anemometer into an ordinary stove would cause it to revolve rapidly. In other words, the ozone which was being generated was not being drawn into the water.

The evidence all shows that the work of the system at Lindsay falls solely on the filters, which clarify the water and remove 30 per cent. of the bacteria present. A fairly good roughing filter ought to remove 40-50 per cent. of the bacteria present.

The covers of the filters and ozonizing wells are not water-tight; during every thaw or rain there is a steady drip into these wells capable of contaminating the water even if it had been purified.

To bring the points of failure of the Lindsay system more vividly to mind I will enumerate them in detail.

1. Leaking of the covers on the filters and pure water reservoir.

The system would achieve practically the same results with the ozonizers shut off or removed. The filters remove 30 per cent. of the bacteria and the ozonizers 8 per cent. more; a fairly good roughing filter should itself remove 40-50 per cent. of the bacteria.

THE DIGBY METHOD OF PRODUCING ELECTROLYTIC CHLORINE.

Sir;—May I ask you to insert the following correction in the Sanitary Review, with regard to the article upon the Digby method of producing electrolytic hypochlorite, which appeared in your issue of April 22nd. The process was there referred to as the "Digby-Shenton method;" this is incorrect, as the process was invented by Mr. Digby, and I have no interest whatever in it, and the patent belongs to Mr. Digby solely. I have merely studied the various processes, and among them the Digby process. It appeared to me that

Mr. Earle Bernard Phelps' statements were open to criticism, and as he had mentioned my name in connection with the Digby process I thought it well to take the matter up. My connection with this particular process, however, is limited to having written a paper dealing with it, jointly with Mr. W. Pollard Digby, some years ago, to which paper Mr. Phelps referred in his report.

Yours truly,
H. C. H. Shenton.

ELEMENTARY ELECTRICAL ENGINEERING.

L. W. Gill, M.Sc.

This series of articles will be continued for some months. They will be of particular interest to the student of electrical work and the civil engineer anxious to secure some knowledge of the simpler electrical problems.

Magnetic Flux (continued).—The symbol for magnetic flux is "ϕ," and the unit is the "maxwell." A circuit with a flux of 1,000 maxwells will thus have 1,000 unit streams of flux and 1,000 lines of force.

The number of unit streams of flux, lines of force, or maxwells per unit area, is known as the "flux density," the unit of which is the "gauss," and the symbol "B." At any point where the flux density is one gauss the sectional area of a unit stream is one sq. cm. If **a** represents the area of any circuit over which the flux density is uniform, it is obvious that $\phi = B\mathbf{a}$. In the case of a magnetic flux in air, the symbol "H" is usually adopted to represent flux density instead of B.

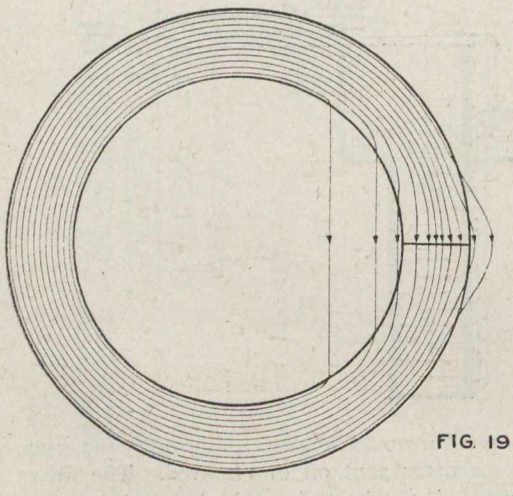


FIG. 19

Magnetomotive Force.—Since by hypothesis magnetic force is caused by a motion or flow of some fluid, it follows that there must be some motive force causing this flow. In the case of the mechanical analogy shown in Fig. 17, the propeller is the seat of a motive force which causes a difference of pressure between its two sides, and as a result of this difference of pressure there is a flow of fluid from the point of higher pressure to the point of lower pressure. In the case of the magnet there is a "magnetomotive force" which sets up a difference of magnetic pressure or potential, and the result is a flow of fluid from points of higher to points of lower magnetic potential. Regarding the nature of magnetomotive force or the mechanism which causes it nothing is known except that each molecule is the seat of such force, since each molecule is a magnet. Each part of a magnet is, therefore, the seat of a magnetomotive force. It is also found that an electric current is the seat of a magnetomotive force. (See section on Electro-magnetism for a full discussion). The unit of magnetomotive force is the "gilbert," the symbol "M," and the abbreviation "m.m.f."

Magnetic Reluctance.—When a difference of pressure causes any fluid to move from one point to another, the motive is opposed by frictional forces. In the case of the electric current this opposition to the flow is known as the "resistance" of the conducting medium. In the case of magnetic flux it is known as "reluctance." The reluctance of any path will vary directly as its sectional area and inversely as its length. It will also depend on the physical nature and condition of the conducting medium. Under given conditions one substance is found to be more permeable to magnetic flux than another, i.e., it will allow more flux to pass per unit of area.

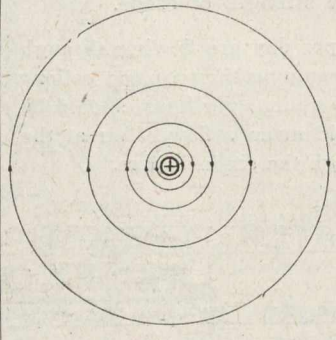


FIG. 20

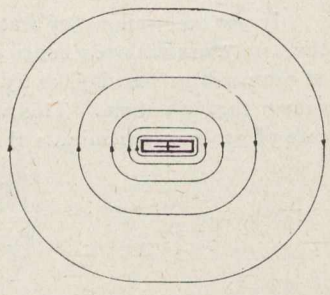


FIG. 20a

The capacity of any substance to conduct magnetic flux in comparison with a vacuum taken as unity, is known as its "permeability." This is represented by the Greek letter "μ." Since the conductivity of air is the same as that of a vacuum, the permeability of a substance may be defined as its magnetic conductivity relative to air. The unit of reluctance is the "oersted," and the symbol "R."

As the permeability increases the flux increases; consequently the reluctance will vary inversely with the permeability. It thus follows that if the sectional area of any magnetic path is represented by **a** and the length by **l**, the expression for reluctance will be

$$R = \frac{kl}{a\mu} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8)$$

k being a constant, the value of which will depend on the unit selected for reluctance. By selecting a suitable unit for the latter the value of **k** is made unity, and the above expression becomes

$$R = \frac{l}{a\mu} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (8a)$$

From the above it is seen that magnetic permeability is analogous to electric conductivity. The former, however, varies greatly with the quantity of flow, while the latter is independent of the flow. This fact makes it much more difficult to deal with magnetic flux than with the flow of electricity. On the other hand, permeability varies very little with change of temperature (except at higher values of temperature), while conductivity varies considerably with temperature.

The Magnetic Circuit.—It has been shown in a previous section that wherever there is magnetism there is a magnetic circuit, around which there is a magnetic flux. This flux is represented symbolically by "lines of force," which always form closed loops. Consider now the whole of any magnetic circuit. Since the flow of any fluid in a

circuit depends directly on the motive force and inversely on the opposing friction, it follows that if a suitable unit is selected for m.m.f.

$$\text{Magnetic Flux} = \frac{\text{Magnetomotive Force.}}{\text{Reluctance}}$$

and if flux is represented by ϕ, magnetomotive force by M, and reluctance by R,

$$\phi = \frac{M}{R} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9)$$

Comparing this equation with (4), which applies to the electric circuit, it will be seen that the two are similar. Equation (9) is known as the equation of the magnetic circuit.

If a bar magnet is bent into the form of a circle, as shown in Fig. 19, the magnetic flux will pass directly from the north to the south pole, and, except for a little leakage at the point of contact of the poles, there will be no magnetic flux passing through the surrounding space. The flux will follow the paths represented by the light lines (lines of force) in the figure. If the ends of this magnet could be joined to form a continuous ring, without disturbing the magnetism, there would be no leakage of flux, and the lines of force would then be confined entirely to the ring. It is thus possible to have a magnetic substance highly magnetized without any external evidence of the fact.

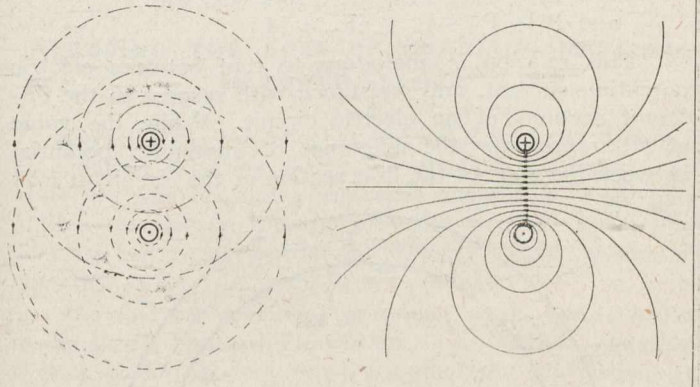


FIG. 21

Electro-Magnetism.—Experiment has shown that every movement of electricity is accompanied by magnetism. Taking the simple case of an electric current flowing in a straight wire, it is found that the movement of electricity within the wire creates a magnetic field in the surrounding space. If the wire is of circular section the lines of force form circles which are concentric with the wire. In Fig. 20 the inner circle represents the section of a wire supposed to pass through the paper at right angles to its plane. The cross in the centre represents the tail of an arrow, indicating that the current is flowing away from the observer. The outer circles, in light lines, represent lines of force. The strength of this magnetic field diminishes directly as the distance from the wire increases. This is indicated in the figure by the distance between the lines of force. (In this connection it will be remembered that the force is equal to the number of lines of force passing through unit area taken at right angles to the lines.) If the section of the conductor is rectangular, the path of the flux will be as shown in Fig. 20 a. If two or more wires carrying equal currents in the same direction are placed side by side the flux will be the same as if the several wires formed a single flat conductor, and the lines of force will be practically as shown in Fig. 20 a. The flux set up by a number of wires placed side by side is thus practically the same as that due to a rectangular conductor of the same dimensions as the group of wires. If the **total** current is the same in each case, the strength of the magnetic field will also be the same.

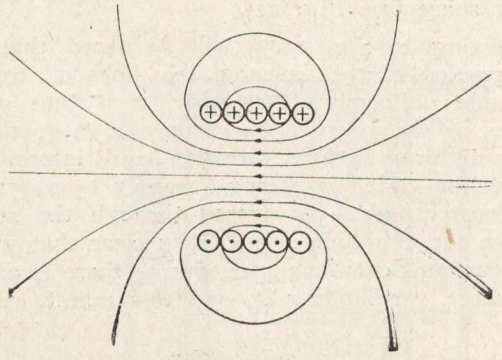


FIG. 22

Two circular wires carrying equal currents in opposite directions are shown in Fig. 21. The small heavy circles represent the wires passing through the paper at right angles. The cross in the centre of one wire represents the tail of an arrow, and the dot in the centre of the other wire represents the head of an arrow, each indicating the direction of current flow. The magnetic field which each current would produce in the absence of the other is shown on the left of the figure by light, dotted lines, and the resultant field is shown on the right. If the single wire is replaced by a flat conductor or by several wires placed side by side and arranged as shown in Fig. 22, the distribution of magnetic flux will be as shown in the same figure. This effect may be obtained by winding a wire around a tube to form a helix. As the current passes around this helix the direction of flow will be the same for every turn on either side, but opposite on the opposite sides of the tube. A section of a tube on which two layers of wire are wound is shown in Fig. 23. The direction of current flow is indicated by dots and crosses, and the resultant magnetic field is represented by the light lines. When the length of such a tube is large compared to its diameter it is known as a "solenoid." Comparing the character of the magnetic

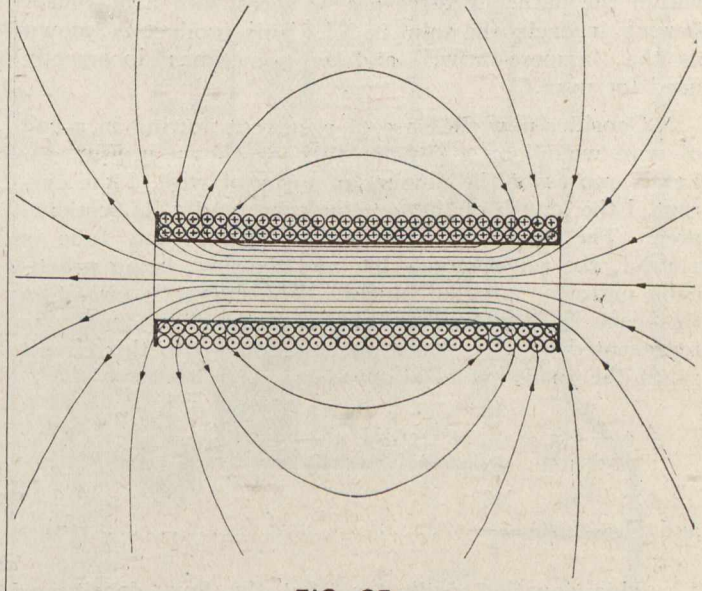
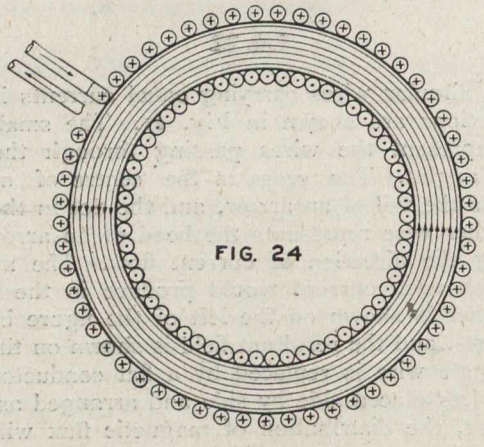


FIG. 23

field produced by the solenoid, as shown in Fig. 23, with that of a bar magnet (Fig. 13), it will be noted that the two are practically identical. A solenoid is thus equivalent to a bar magnet. If the ends of a solenoid are brought together the flux will pass directly from one end into the other, and there will be no flux in the surrounding space (see Fig. 24).

Referring to Fig. 23, it will be noted that in the central portion of the solenoid the lines of force are parallel and uniformly distributed. It is thus possible by means of the solenoid to produce a magnetic field which is uniform both in direction and intensity, and which can be varied in strength simply by varying the electric current which is passed through the solenoid.

From the above discussion it is clear that when an electric current flows in any conductor there is a m.m.f. in the space surrounding it, and this m.m.f. causes a



magnetic flux to flow around the current. The total m.m.f. acting along any path which encircles the current is 1.26 times the total current enclosed within the path, the total current being the sum of all the currents included within the path. If there are N wires with a current I flowing in each, the total is NI. This product is known as the "ampere-turns," and is sometimes incorrectly used for m.m.f.

Consider now the case of a current flowing in a coil of wire wound on a circular tube as shown in Fig. 24. Let N represent the number of turns of wire, I the current, **l** the length of the circular tube, and **a** its sectional area. The m.m.f. of the circuit within the tube is 1.26NI, the reluctance is **l/a**, and the flux, being practically uniform, is equal to **Ha**. (The magnetic circuit in this case is composed of air, and the flux density is represented by H.) Applying equation (9) to this circuit gives the following relations:—

$$\phi = Ha = \frac{M}{R} = 1.26NI \times \frac{a}{l}$$

$$\text{and } H = 1.26 \frac{NI}{l} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

This equation indicates that the flux density or strength of the magnetic field within the tube varies directly with the current, and also with the number of turns of wire per unit length of circuit. Outside the tube there is no magnetic field.

Suppose, now, that this tube is filled with some magnetic substance, such as iron. The reluctance of the circuit will now be $\mathbf{l/a}\mu$. Applying equation (9) as before, the expression for flux density is found to be

$$B = 1.26 \frac{NI\mu}{l} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

Combining equations (10) and (11) gives the relation

$$\frac{B}{H} = \mu \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (12)$$

Consider now a circuit which is made up of different substances, as shown in Fig. 25. Let l_1, l_2, l_3, etc., a_1, a_2, a_3, etc., μ_1, μ_2, μ_3, etc., represent respectively the lengths (measured around the circuit), the sectional areas, and the permeabilities of the various substances. Then if R_1, R_2, R_3, etc., represent the reluctances of the respective parts of the circuit, then

$$R_1 = \frac{l_1}{a_1 \mu_1}; \quad R_2 = \frac{l_2}{a_2 \mu_2}; \quad R_3 = \frac{l_3}{a_3 \mu_3}, \text{ etc.}$$

Substituting in equation (9) gives the expression

$$\phi = \frac{M}{R_1 + R_2 + R_3 + \text{etc.}}$$

and transposing,

$$M = \phi R_1 + \phi R_2 + \phi R_3 + \text{etc.}$$

If P_1, P_2, P_3, etc., represent respectively the difference of magnetic potential between the ends of each section of the circuit, then

$$P_1 = \phi R_1; \quad P_2 = \phi R_2; \quad P_3 = \phi R_3, \text{ etc.},$$

$$\text{and } P_1 + P_2 + P_3 + \text{etc.} = M$$

This relation is analogous to that between electric potential, current, and resistance with respect to the different sections of an electric circuit. While the value of ϕR_1 represents the difference of magnetic potential between the ends of the first section of the circuit, it may

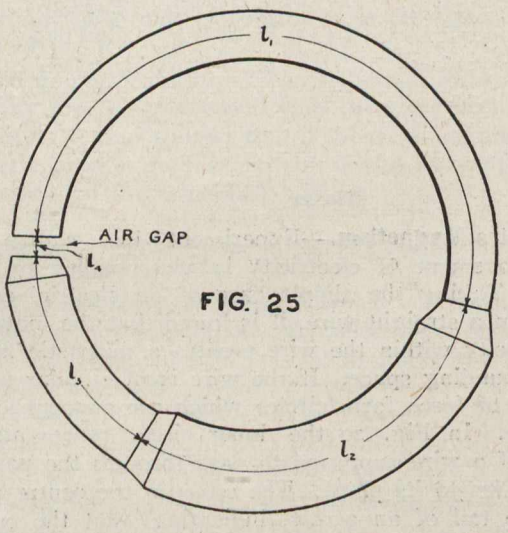


FIG. 25

also be regarded as representing the m.m.f. which is required to force the flux ϕ against the reluctance R_1.

Example 7.—A magnetic circuit is made up as follows (see Fig. 25): Cast-iron, **l** = 10 cms., **a** = 12 sq. cms., μ = 200; wrought iron, **l** = 20 cms., **a** = 6 sq. cms., μ = 2,100; air, **l** = .2 cm., **a** = 6 sq. cms. To determine the m.m.f. required to produce a flux of 60,000 maxwells.

Reluctance of first section = 10/ (12 × 200) = .00416 oersted.

Reluctance of second section = 20/ (6 × 2100) = .00159 oersted.

Reluctance of third section = .2/ (6 × 1) = .03333 oersted.

Reluctance of whole circuit = .03908 oersted.

M = φR = 60,000 × .03908 = 2345 gilberts.

The same result is obtained by determining the m.m.fs. required for each portion of the circuit. This method is instructive in that it shows the distribution of magnetic potential as follows:—

The m.m.f. required for the cast-iron = 60,000 × .00416 = 250 gilberts.

The m.m.f. required for the wrought iron = 60,000 × .00159 = 95 gilberts.

The m.m.f. required for the air = 60,000 × .03333 = 2000 gilberts.

The m.m.f. required for the circuit = 2345 gilberts.

It will be noted that, while the length of the air portion of the circuit is relatively small, the m.m.f. required for this portion is relatively large. This is due to the difference in the permeabilities.

The principles above stated are directly applicable to all kinds of electrical machinery, such as motors, generators, transformers, etc., each of which has its magnetic circuit (or circuits), as well as its electric circuit. A general knowledge of the underlying principles of the magnetic circuit is, therefore, essential to any study of electrical work.

"REDUCING THE COST OF HANDLING MATERIAL IN POWER PLANTS."

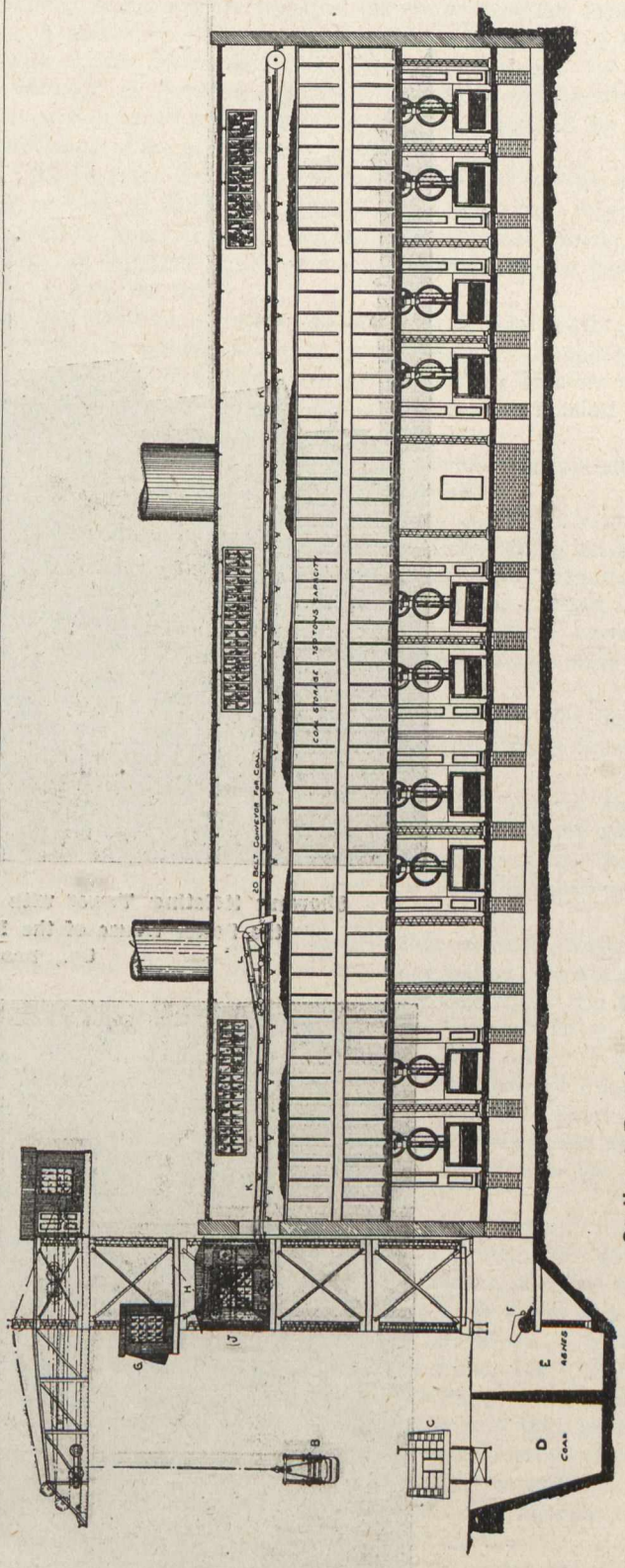
Reducing the cost of labor and minimizing the handling of materials in power plants is becoming more necessary every day and consulting engineers situated in every part of this country are constantly on the alert to adopt the simplest and most practical methods for keeping down the operating costs.

The unusual conditions prevailing at the power house of the Peoria Gas and Electric Co., a corporation operating over 4,100 h.p. boilers supplying the light and power at Peoria, Ill., necessitated a special type of mechanical equipment for the conveying of their coal directly from the cars to the fires under the boilers and handling the ashes from the ash pits.

The accompanying illustrations comprising three photographic views, show how this is accomplished, and on account of limited space we describe only briefly the distinctive features about this mechanical equipment, which was designed to handle 50 tons of either coal or ashes per hour, but, as a matter of fact, it is frequently handling double that tonnage.

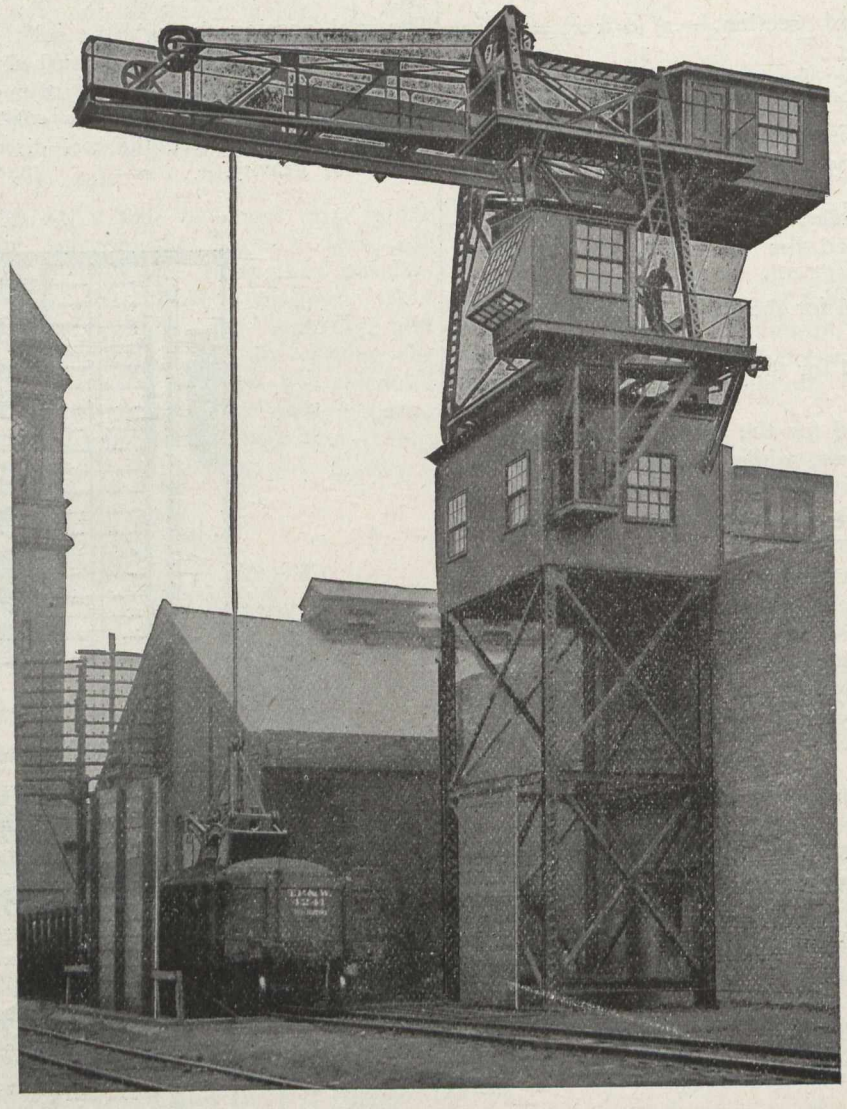
The fuel that is being used is run of mine coal, which is delivered alongside the plant in 30-ton railway cars. Figure 1 shows a plan and elevation of the entire power house and with the equipment in place; it will be seen that the cars may be either dumped into the track pit or unloaded direct from the car by the grab bucket, which is operated by cable, and electrically driven double drum hoist situated on the cantilever tower, as will be seen in photograph Figure 2.

Figure 3 shows the receiving hopper placed in the tower where the coal is dumped from the bucket to a 2-roll crusher, electrically driven. This is accomplished by means of a reciprocating plate feeder, equipped with a perforated bottom, which allows the fine coal to bi-pass around the crusher, delivering only the lump coal to the crusher rolls. The coal passing through the rolls is delivered to a belt conveyer, which deposits the crushed coal into the storage bunkers by means of a travelling tripper. The bunkers, having a capacity of over 750 tons coal storage, are so constructed that they feed the coal direct to the automatic stokers by gravity.

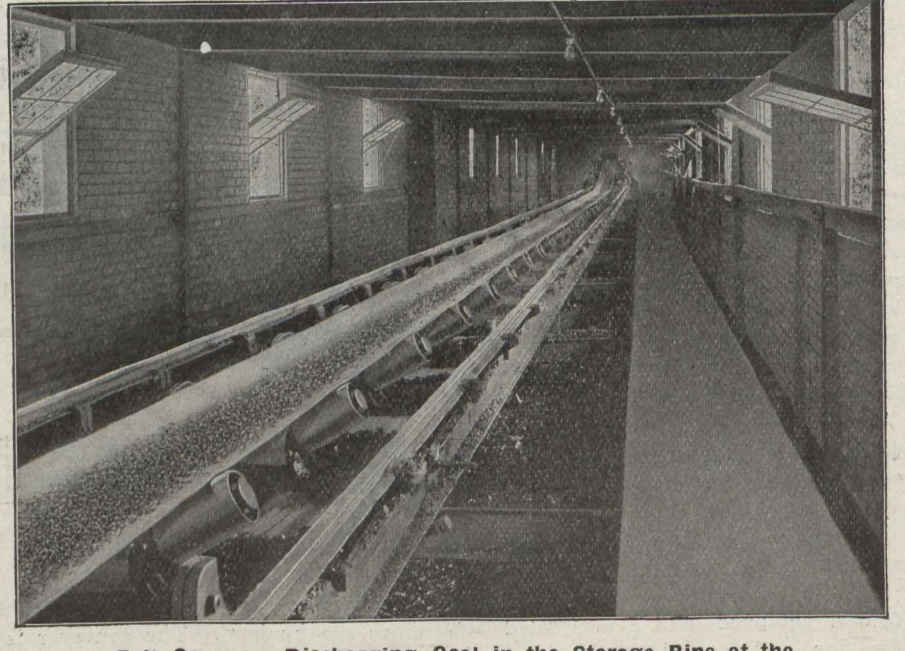


Sectional Drawing Power House, Peoria Gas and Electric Co., Peoria, Ill.

Figure 4 shows a photograph of the belt conveyer house above the bunkers. The conveyer is 225 feet between centres and is 20 inches wide, and is 6-ply Jeffrey Standard Canvas Belting. The top strand of this belt is carried on



Showing Hoisting Tower with Crab Bucket and Hopper at the Power House of the Peoria Gas and Electric Co., Peoria, Ill.



Belt Conveyer Discharging Coal in the Storage Bins at the Power Plant of the Peoria Gas and Electric Co., Peoria, Ill.

a three-pulley troughing idler, the return strands being carried on two-pulley straight face idlers. This conveying belt is equipped with an automatic, self-propelling and self-reversing tripper, provided with a brush for cleaning the belt and also a two-way discharge spout for distributing the coal evenly along the storage bunker.

The operator on the tower has his station in the cab, and operates two controllers, two clutch levers and one foot lever to handle and control all the movements of the buckets. Windows are provided in the tower to enable the operator to look in all directions. A single laborer is needed part of the time in the car to clean up the coal that cannot be reached by the grab bucket. The bucket will handle nearly every particle of the coal, and at no time will more than ½ ton remain in the car.

The tower is built of structural steel, weighing approximately 65,000 lbs., towering in height 71 feet. The cantilever truss is a trifle over 30 feet long and is counter-balanced by the machinery house. The method adopted for the removal of the ashes is simple and is explained by referring to the drawing, Figure 1, the ashes coming from the ten fires into the deep steel barrows and are taken to the ash pit, where they are loaded to the railway cars by the grab bucket.

This entire equipment was designed, built and erected by the Jeffrey Mfg. Co., of Columbus, O. The result of the official tests made by the engineers in charge for the Peoria Gas and Electric Co., have also been made known to us and are published here only in a brief way. On May 19th, C. P. & St. L. Car No. 1125, containing 30 tons of fine coal, was unloaded by the grab bucket in 25 trips, averaging 1-2 ton of coal per trip in less than 25 minutes. The total cost of labor and actual power consumed for the entire 30 tons amounted to less than 40c. The cost per ton for handling the coal for a previous 3 months ending March 31st, showed a total net saving of over 16c. per ton, compared with the former methods, when only labor had been used for this same purpose, and an actual saving of over $10,000 for the first year with the use of this modern installation.

GERMAN STANDARDS FOR DELIVERY AND TESTING OF PORTLAND CEMENT.

Prepared by the "Verein Deutscher Portlandzement Fabrikanten," with the collaboration of the Royal Testing Laboratory, at Gross-Lichterfelde, 1909.

(Translated from the German by H. de Miffonis, B.Sc., C.E., M. Soc. du Inginieurs civils de France.)

I.—**Definition:**—Portland cement is a hydraulic cementing material, containing not less than 1.7 parts of lime (CaO) by weight to 1 part of soluble silica (SiO^2), alumina (Al^2O^3), and iron oxide (Fe^2O^3), finely ground, intimately mixed, calcined to incipient fusion and again finely ground.

To this flour, not more than 3 per cent. of other material may be added when required for special purposes.

The proportion of magnesia must not exceed 5 per cent., and that of sulphuric acid anhydride, 2½ per cent. of the burned cement.

Comment:—Portland cement differs from all other hydraulic products by the high percentage of lime it contains; therefore a thorough mixing of the ingredients is necessary, these being proportioned to a given ratio; as a matter of fact, cement rock occurring seldom in nature, an artificial mixture is generally used, which is formed by pulverizing or diluting with water the ingredients and checking the composition of the powder or slurry by chemical analysis.

It is to the customer's interest that similar products obtained by moderate calcination of natural cement rocks be sold as "natural cements."

By calcination to incipient fusion, a material of high apparent density (weight per cubic foot) is produced, this property being a characteristical feature of Portland cement.

A proportion of magnesia less than 5 per cent., as that which occurs when dolomitic limestones are used for the fabrication of Portland cement, has been proved harmless, the proportion of magnesia being taken into account for the calculation of the proportion of limestone.

To lengthen the time of setting of Portland cement, it is the custom to add some gypsum flour (hydrated calcium sulphate), apart from the sulphuric compounds which, in nearly all Portland cement, come either from the raw materials or from the fuel.

The addition of other material for special purposes, especially to regulate the time of setting, is not prohibited, but it must be less than 3 per cent., in order to allow the checking of adulterations for the sole object of increasing the apparent density.

A proportion of sulphuric acid anhydride, not exceeding 3.5 per cent., has been proved to be harmless.

II.—**Packages and Weight:**—Portland cement is sold in sacks or in barrels. On the package must be plainly marked in addition to the gross weight and the mark "Portland Cement," the name of the manufacturer and the brand.

Comment:—As the packages, sacks as well as barrels, have generally different weights, the gross weight must always be given on the label.

Under the designation of "Portland Cement" the buyer must be sure that the material purchased is strictly according to the definition heading these rules.

III.—**Time of Setting:**—Normal Portland cement shall not develop initial set in less than one hour after water being added to cement. For special purposes quicker setting Portland cement may be required, and they must be labelled as such.

Comment:—The rules specify that normal Portland cement shall require at least one hour before developing initial set, because the initial set is very important. On the contrary, the limitation of the time which elapses between the addition of water and the hard set has been taken off the rules, being found of little importance when using Portland cement, if the process of hardening requires more or less time to be complete. Therefore, specifications in connection with the time required for final set should not hereafter be too restrictive.

To test the time of setting of a Portland cement, 100g. (3.5 oz.) of pure cement is mixed with water, for three minutes in the case of a slow setting cement, and for one minute if the cement is quick setting, in such a way that a stiff paste is obtained; this paste is placed on a plate-glass and formed into a circular pat 1.5 c.m. (5/8") thick, tapering to a thin edge. For the preparation of this pat, the necessary consistency of the paste must be such that, placed on plate-glass, it tapers at the edge by some tossing of the plate; this result is generally obtained with the addition of 27 to 30 per cent. of water to the cement. The moment the paste ceases to be fluid and plastic is to be noted.

The determination of the initial set and of the length of time which elapses till the final set is made with a normal cylindrical needle of 1 m.m.^{2} ($\frac{15}{10{,}000}$ sq. inch) section and

weighing 300g. (10.6 oz.), the base being cut at right angle with the axis. A conical ring of hard rubber, 4 c.m. (1.57-inch) high and 7 c.m. (2.75-inch) middle diameter, placed on a plate-glass, is filled with Portland cement paste (about 300g.) having the above described consistency, and is put under the needle. The moment when the normal needle can no more go through the paste is considered as the initial set. The time which elapses till the needle does not leave any distinct mark on the pat, is the time of setting.

The setting of Portland cement is influenced by the temperature of the air, and that of the water used for mixing, the setting being quicker at a high temperature and slower at a low one; therefore it is necessary, in order to obtain uniform results, to make the tests with cement and water at 15-18° C., the temperature of the air, also that of the apparatus and sand being the same.

The general belief that Portland cement loses some of its strength by long storage is erroneous, as long as the cement is kept in a dry place free from draught. The specifications calling for fresh cement should, therefore, be dropped.

IV.—**Constancy of Volume:**—Portland cement must be of constant volume. The normal test consists in checking that a pure cement pat placed on a plate-glass where it is kept moist, and after 24 hours immersed in water, shall not show, later on, any distortion or cracking of the edges.

Comment:—For this test, the pat made for the verification of the time of setting is immersed in water, 24 hours after adding water for mixing when cement is slow-setting, or in any case after the final set. For quick-setting cement, this length of time may be shortened. The pats, especially for slow-setting cement, must be kept moist after the initial set, to store them in a covered box being the best way to keep them so. This precaution shall avoid cracks due to quick drying. Such cracks generally appear in the centre of the pat, and may be confounded with cracks due to swelling by untrained testers.

When hardening under water, if the pat shows distortion and checking, it is a certain proof of unsoundness of cement, i.e., owing to an increase of volume the cement cracks and the initial cohesive strength already gained is destroyed, the total disintegration of cement being even liable to follow.

The above indicated proofs of unsoundness appear on the pat usually after 3 days; in any case, a test of 28 days is conclusive.

V.—**Fineness:**—Portland cement must be so fine that it leaves on a sieve of 900 meshes to the square centimetre, not more than 5 per cent. of the sieved cement. The width of mesh of the sieve shall be 0.222 m.m.

Comment:—The test shall be made with 100g. (3.52 oz.) of cement.

It is difficult to obtain true sieves on the market and some variation must be allowed, as long as the width of mesh is neither below 0.215 m.m., nor above 0.240 m.m.

As Portland cement is nearly always used with sand, in many cases even with a high percentage of that material, the fineness of cement is very important, for the finer is the cement used, the greater is the strength of the mortar, (the particles possessing cementing qualities are then more numerous.) But it would be misleading to judge of the quality of a cement only by its fitness.

VI.—**Strength of Cement:**—Portland cement shall be tested for compressive strength on a mixture of cement and sand, according to the normal test, hereafter given, the cubes used being of 50 sq. c.m. (7.75 sq. inch) in section.

Comment:—As it is not possible to ascertain the sand carrying capacity of a cement from tests made on pure cement paste, especially when it is purposed to compare cements manufactured by different firms, it is necessary to test the strength of a cement with the addition of sand.

Mortar Portland cement working nearly always in compression, and the compressive strength of a mortar being easy to test, the test by compression is the only strength test maintained.

In order to obtain the necessary uniformity of testing, the same apparatus and accessories are recommended, as those used at the Royal Testing Laboratory at Gross-Lichterfelde.

VII.—**Compressive Strength:**—Slow-setting cements must give at least 120 kg./c.m.^{2} (1,706 lbs. per sq. inch), when mixed to three parts in weight of normal sand for each part of Portland cement, and hardened for 7 days—1 day in moist air and 6 days in water—; if the hardening is continued for 21 more days in the air at 15°-30° C., the compressive strength must be at least 250 kg./c.m.^{2} (3,555 lbs. per sq. inch). In case of contest, the 28-day test only is conclusive.

Portland cement, to be used under water, must, after 28 days—1 day in moist air, 27 days in water—give a compressive strength of at least 200 kg./c.m.^{2} (2,884 lbs. per sq. inch).

For quick-setting cement the compressive strength after 28 days is usually less than the figures above given; therefore, the time of setting must be always investigated when testing the strength of a cement.

Comment:—As cements differ often one from another by their sand-carrying capacity, a property which may be considered as very important from a practical standpoint, it is absolutely necessary to make the tests with high percentages of sand, especially when comparing different cements. The normal proportion shall be 3 parts of sand to 1 part of cement in weight, as with this proportion of sand the strength of different cements is easily tested by compression.

But when the exact strength of a cement is wanted, it is advisable to make a series of tests with higher percentages of sand.

A Portland cement having a higher strength carries very often more sand and for that reason, as well as because it gives a higher strength for the same proportion of sand, it can command a higher price.

The greatest quantity of Portland cement being used for construction work, and as it is not possible to test its strength in a relatively short time, the test by compression after 28 days—1 day in moist air, 6 days in water, 21 days in air to 15°-30° C.—should be the standard test for strength.

For Portland cement used in hydraulic works, the test after 27 days' immersion in water shall give the necessary data for practical purposes.

In order to obtain uniform data, the sand used everywhere should have the same composition and size of grain (normal sand). The German normal sand is extracted from a stratum of tertiary quartz of the "Braunkohlen" formation near Freienwalde, A.O. The raw sand, nearly white, is mechanically washed and artificially dried. The dry sand is sieved with sieves shaken by mechanical power. A first sieve retains the largest grains, while another one lets past the dust. Each day, a sample taken from the daily production is tested for size of grain and purity by the Royal Testing Laboratory at Gross-Lichterfelde.

For testing the size of grains a sieve is used, formed of a brass sheet, 0.25 m.m. thick, bored with circular holes between 1.350 and 0.775 m.m. in diameter. When the normal sand has been completely tested and approved, it is put in sacks, and each sack is sealed with the seal of the Royal Testing Laboratory.

Description of the test for compressive strength:—As it is important that tests of the same Portland cement at different places should give corresponding results, it is necessary that the following rules be carried out.

To be exact, the means are to be taken from at least 5 briquettes prepared for each test.

Preparations of mortar briquettes.—Fabrications of the normal mortar (1:3) and of the briquettes for compressive tests:—

(a) Mixing Mortar:—Mortar made of one part of Portland cement to three parts of normal sand in weight is mixed in the Steinbrück-Schmelzer mortar mixer as follows: 400g. (14 oz.) of cement and 1,200g. of sand are mixed dry with a light spoon in a cup, for one minute; to the dry mixture is added the necessary quantity of water; the whole is then mixed for one minute more and the mass is equally spread in the mortar mixer and worked by 20 revolutions of the basin.

Dimensions of the Mixer

Weight, of the roller.		Thickness,	Diameter,	Distance from the middle plane of the roller to the centre of the basin c.m.	Space left free between the roller and the basin c.m.
with axle kg.	without axle kg.	c.m.	c.m.		
21.5-22.0	19.1-19.4	8.08	20.25-20.35	19.7-19.8	0.50-0.60

(b) Quantity of water to be added:—The determination of the quantity of water to be added to normal mortar is obtained from a test with the briquette form as follows:

A dry mortar mixture, prepared as above, is mixed with 128g. (8 per cent.) of water for the first test, and, if necessary, with 160g. (10 per cent.) for the second test; the mixing is made in the mortar mixer as already explained.

850 to 860g. of this thoroughly mixed mortar is put in a form of which the cover carries 2 gutters on its lower face; the whole is placed in the Böhme ramming machine, improved by Martens, and 150 taps are given on top of mortar.

The correct quantity of water is judged from the behaviour of the mortar under the ramming and that quantity is modified accordingly for subsequent tests.

When the proper quantity of water has been added, the mortar begins to flow through one of the gutters between the 90th and the 110th blow.

The mean of three tests on briquettes containing an equal quantity of water gives a result considered as conclusive. The mortar flows out more slowly from a dry form than from a form already used, therefore, the results obtained when using the mould for the first time may be inaccurate.

(c) How to make briquettes:—The preparation of normal mortar briquettes shall be as follows:

850 to 860g. of mortar, mixed as indicated above, is to be put in the normal cubic form and placed in the Böhme ramming machine, improved by Martens, in which it receives 150 taps.

A knife is then drawn over the mould and the briquette face, made smooth, is marked.

The quantity of mortar obtained with 400g. of Portland cement and 1,200g. of normal sand is sufficient for two briquettes. These briquettes are to be kept in a moist closet, resting on a non-absorbent material, and are to be taken out of the moulds after 20 hours; 24 hours after their completion the briquettes are immersed in water at 15 to 18° C.

The briquettes prepared for hardening under water must only be taken out of water at the time of the test. They should not be covered with more than 2 cm. (¾ in.) of water, same being renewed at least every 14 days. The briquette prepared for hardening in the air must be kept separate and resting on wooden tripods in a closed room sheltered from draught and at a temperature of from 15 to 30° C.

How to handle the briquettes when testing:—When testing, in order to obtain uniform results, the pression shall be always applied on the Lateral faces of the cube, but neither on the lower face nor on the upper one which has been more completely worked.

The mean of 5 tests gives the compressive strength of the cement.

INGLIS COMPANY LAUNCH FINE BOAT.

The John Inglis Company, of Toronto, launched the Rapids Prince, a new passenger steamer for the Richelieu and Ontario Navigation fleet, Saturday last. The hull was built for the John Inglis Company by the Toronto Shipbuilding Company. The boat was designed by the Richelieu and Ontario Navigation Company's engineers. It draws six feet of water; length, 205 feet; beam breadth, 43 feet 6 inches; depth of hull, 9 feet 6 inches. The boat is licensed to carry twelve hundred passengers. It is a sister ship to the Rapids King and the Rapids Queen, owned by the same navigation company.

The Rapids Prince carries twin screw triple expansion engines with cylinders 12½ inches, 20 inches, and two 22 inches diameter, by 16 inches stroke. Steam is supplied by one Scotch boiler, 14 feet 8 inches in diameter, 12 feet long, with the Howden system of forced draught and a working pressure of 170 pounds. There are six feed pumps and a vertical jet condenser.

There are a number of water-tight compartments, and also the steel hull is sheeted on the bottom with four inches of oak to protect it in going through the rapids. The boat is equipped with steam and hand-steering apparatus. It is lighted with electric light supplied by a Westinghouse direct connected 22 kilowatt generator of 250 volts. The main deck is of steel and above this are three wooden decks. There will be fifty-six state rooms, all of which have outside windows. The salon between the state rooms will be finished in white pine panels. On the main deck will be an entrance hall with stair-case to salon above, while the dining hall will be located directly at the top of the stairs. Both the hall and dining room will be finished in red oak.

Below the main deck are the crew's quarters, waiters' rooms, and a completely equipped pantry and kitchen. The pilot house is on the top deck, together with the officers' rooms, a large observation room and the usual lunch counters, etc. The state rooms are fitted with hot and cold running water throughout.

The vessel was christened by Mrs. Rodolphe Forget, wife of the president of the Richelieu and Ontario Navigation Company. It will be completed about July 15th, when the trial trip will be made, after which the boat will be used between Prescott and Montreal on the St. Lawrence River. Among the directors and officials of the Richelieu and Ontario present at the launching were Messrs. Rodolphe Forget, William Wainwright, George Caverhill, Major Haig Sims, H. Markland Molson, Honorable Senator Casgrain, Sir Henry M. Pellatt, General Manager C. J. Smith, Traffic Manager Thomas Henry, Mechanical Superintendent Captain G. Johnston, and Assistant General Passenger Agent H. Foster Chaffee.

Consult our Catalogue Index on page 10. We can put you into immediate touch with the principal manufacturers of and dealers in all kinds of engineering and contracting equipment. A postcard to this department will insure the receipt of the desired catalogue.

Select List of Engineering Books

Corrosion and Preservation of Iron and Steel.—By Allerton S. Cushman, A.M., Ph.D., Assistant Director and Chemist in Charge of Physical and Chemical Investigation, Office of Public Roads, United States Department of Agriculture, and Henry A. Gardner, Director, Scientific Section, Paint Manufacturers' Association of the United States. 375 pages, 6 x 9, illustrated, $4.00 (17s.) net, postpaid. This publication was reviewed in The Canadian Engineer for May 20th, 1910, on page 510. It is the first authoritative treatise on a most serious problem in all branches of engineering. The causes and theories of corrosion are fully covered, and special emphasis is laid on protective coatings, inhibitive pigments, etc., for all classes of iron and steel work. The authors are respectively the leading authorities in their special fields. The main chapter headings are: I.—The Corrosion and Preservation of Iron and Steel. II.—Theory of Solution. III.—The Theory of Corrosion. IV.—Application of Electrolytic Theory. V.—The Inhibition and Stimulation of Corrosion. VI.—The Technical Protection of Iron and Steel. VII.—Relation of Pigments to the Corrosion of Iron. VIII.—Recent Field Tests on Protective Coatings for Iron and Steel. IX.—Paints for Various Purposes. X.—The Testing and Design of Protective Paints. XI.—Properties of Pigments. XII.—The Properties of Paint Vehicles.

Corrosion of Iron and Steel.—A brief treatise on the decay of iron and steel. By Alfred Sang. 130 pages, 5 x 8, $1.00.

Electric Power Plant Engineering.—By J. Weingreen. 420 pages, 6 x 9, illustrated, $5.00.

Steam Power Plant Piping Systems.—By W. L. Morris, M.E. 490 pages, 6 x 9, 389 illustrations, $5.00.

Water Power Engineering.—The Theory, Investigation and Development of Water Power. By Daniel W. Mead, Professor of Hydraulics, University of Wisconsin. 803 pages, 6 x 9, 413 illustrations, $6.00. The standard work for both practice and instruction. It covers fully the details of the entire engineering problem from the first investigations to the completed plant.

Design and Construction of Hydro-electric Plants.—With special reference to the Design of Dams. By R. C. Beardsley. 520 pages, 6 x 9, 68 tables, 471 illustrations, $5.00. A hydraulic and hydro-electric engineer's handbook.

Cement and Concrete.—By Louis Carlton Sabin. Second edition, revised and enlarged. 584 pages, 6 x 9, 161 tables of tests, illustrated, $5.00. A treatise designed especially for American engineers, covering the manufacture, properties and testing of cement, and the preparation and use of cement mortars and concretes. Special attention is given to the costs of cement and concrete for different uses and under various conditions.

Reinforced Concrete.—By A. Considere. Translated from the French, with a preface and additions by Leon S. Moisseiff. Second edition, enlarged. 242 pages, 6 x 9, 32 figures, $2.00.

Concrete Bridges and Culverts.—By H. Grattan Tyrrell. Contents: Plain Concrete Arch Bridges—Reinforced Concrete Arch Bridges—Highway Beam Bridges—Concrete Culverts and Trestles. Flexible leather, 6¾ x 4½ inches, 272 pages, 66 illustrations, $3.00.

Concrete Inspection.—By Charles S. Hill, C.E. 186 pages, 3½ x 6, $1.00.

Concrete Construction Methods and Costs.—By Halbert P. Gillette and Charles S. Hill. 700 pages, 6 x 9, 306 illustrations, $5.00.

Treatise on Masonry Construction.—By Ira Osborn Baker, B.S., C.E., D. Engineering, Professor of Civil Engineering, University of Illinois, etc. Tenth edition, entirely rewritten and enlarged. 8vo., xvi. + 746 pages, over 100 tables and 244 illustrations, cloth, $5.00.

Concrete and Reinforced Concrete Construction.—By Homer A. Reid, Assoc. M. Am. Soc. C.E. The most comprehensive book on this subject. It is a combination of several books, carefully written and up-to-date. Contains 200 working drawings of bridges, bridge piers and culverts; 60 working drawings of sewers, water mains and reservoirs; 30 working drawings each of retaining walls and dams; 200 working drawings of buildings and foundations, including shops, roundhouses, etc. 906 pages, 715 illustrations, 70 tables, $5.00.

Engineers' Pocketbook of Reinforced Concrete.—By E. Lee Heidenreich. The chapters are as follows: Materials and Machines used in Concrete Construction; Design and Construction of Buildings; Design and Construction of Bridges; Abutments and Retaining Walls; Culverts, Conduits, Sewers, Pipes and Dams; Tanks, Reservoirs, Bins and Grain Elevators; Chimneys. Miscellaneous Data. 132 pages, 6 x 9, many diagrams and tables, $2.00.

Reinforced Concrete.—A manual of practice. By Ernest McCullough, M. West. Soc. C.E. 136 pages, $1.50.

Inspectors' Handbook of Reinforced Concrete.—By Ballinger and Perrot. Flexible cloth, 4½ x 6½, 64 pages, 6 folding diagrams, $1.00.

Concrete-Steel Construction (Der Eisenbetonbau).—By Prof. Emil Mörsch. Translated from (1908) German edition by E. P. Goodrich. Buckram, 6½ x 9½, x+368 pages, 350 illustrations (including 2 folding plates), $5.00.

Reinforced Concrete.—By A. W. Buel and Charles S. Hill. Second edition, entirely rewritten. Cloth, 6 x 9, 500 pages, tables, diagrams and 357 illustrations, $5.00.

Concrete System.—By Frank B. Gilbreth. Flexible morocco, 8½ x 11, 200 pages, 220 illustrations and 10 folding plates; printed on finest coated paper, $5.00.

Practical Hints for Concrete Constructors.—By W. J. Douglas. Paper, 4½ x 7, 60 pages, 3 illustrations, 25 cents.

Principles of Sewage Treatment.—By Prof. Dr. Dunbar, Director of the Hamburg State Hygienic Institute. Translated by H. T. Calvert, M.Sc., Ph.D., F.I.C. 271 pages, 147 illustrations, 6 x 9, cloth, $4.50.

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CANADIAN FORESTRY ASSOCIATION.—President, Thomas Southworth, Toronto; Secretary, James Lawler, 11 Queen's Park, Toronto.

CANADIAN MINING INSTITUTE.—Windsor Hotel, Montreal. President, Dr. Frank D. Adams, McGill University, Montreal; Secretary, H. Mortimer-Lamb, Montreal.

CANADIAN RAILWAY CLUB.—President, H. H. Vaughan; Secretary, James Powell, P.O. Box 7, St. Lambert, near Montreal, P.Q.

CANADIAN STREET RAILWAY ASSOCIATION.—President, D. McDonald, Manager, Montreal Street Railway; Secretary, Acton Burrows, 157 Bay Street, Toronto.

CANADIAN SOCIETY OF FOREST ENGINEERS.—President, Dr. Fernow, Toronto; Secretary, F. W. H. Jacombe, Ottawa.

CENTRAL RAILWAY AND ENGINEERING CLUB.—Toronto, President, J. Duguid; Secretary, C. L. Worth, 409 Union Station. Meets third Tuesday each month except June, July, August.

DOMINION LAND SURVEYORS.—President, Thos. Fawcett, Niagara Falls; Secretary-Treasurer, A. W. Ashton, Ottawa.

EDMONTON ENGINEERING SOCIETY.—President, Dr. Martin Murphy; Secretary, B. F. Mitchell, City Engineer's Office, Edmonton, Alberta.

ENGINEERING SOCIETY, TORONTO UNIVERSITY.—President, A. D. Campbell; Corresponding Secretary, A. H. Munroe.

ENGINEER'S CLUB OF TORONTO.—96 King Street West. President, C. M. Canniff; Secretary, R. B. Wolsey. Meeting every Thursday evening during the fall and winter months.

INSTITUTION OF ELECTRICAL ENGINEERS.—President, Dr. G. Kapp; Secretary, P. F. Rowell, 92 Victoria Street, London, S.W.; Hon. Secretary-Treasurer for Canada, Lawford Grant, Power Building, Montreal, Que.

INSTITUTION OF MINING AND METALLURGY.—President, Edgar Taylor; Secretary, C. McDermid, London, England. Canadian Members of Council:—Prof. F. D. Adams, J. B. Porter, H. E. T. Haultain, and W. H. Miller, and Messrs. W. H. Trewartha-James and J. B. Tyrrell.

MANITOBA LAND SURVEYORS.—President, George McPhillips; Secretary-Treasurer, C. G. Chataway, Winnipeg, Man.

NOVA SCOTIA MINING SOCIETY.—President, T. J. Brown, Sydney Mines, C.B.; Secretary, A. A. Hayward.

NOVA SCOTIA SOCIETY OF ENGINEERS, HALIFAX.—President, S. Fenn; Secretary, J. Lorne Allan, 15 Victoria Road, Halifax, N.S.

ONTARIO PROVINCIAL GOOD ROADS ASSOCIATION.—President, W. H. Pugsley, Richmond Hill, Ont.; Secretary, J. E. Farewell, Whitby, Ont.

ONTARIO LAND SURVEYORS' ASSOCIATION.—President, H. W. Selby; Secretary, Killaly Gamble, 703 Temple Building, Toronto.

ROYAL ARCHITECTURAL INSTITUTE OF CANADA.—President, F. S. Baker, F.R.I.B.A., Toronto, Ont.; Hon. Secretary, Alcide Chausse, No. 5 Beaver Hall Square, Montreal, Que.

ROYAL ASTRONOMICAL SOCIETY.—President, Prof. Alfred T. de Lury, Toronto; Secretary, J. R. Collins, Toronto.

UNDERGRADUATE SOCIETY OF APPLIED SCIENCE, McGILL UNIVERSITY.—President, H. P. Ray; Secretary, J. P. McRae.

WESTERN CANADA RAILWAY CLUB.—President, Grant Hall; Secretary, W. H. Rosevear, 199 Chestnut Street, Winnipeg, Man. Second Monday, except June, July and August, at Winnipeg.

AMERICAN TECHNICAL SOCIETIES.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS (TORONTO BRANCH).—W. H. Eisenbeis, Secretary, 1207 Traders' Bank Building.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—President, John P. Canty, Fitchburg, Mass.; Secretary, T. F. Patterson, Boston & Maine Railway, Concord, N.H.

AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION.—President, L. C. Fritch, Chief Engineer, Chicago G. W. Railway; Secretary, E. H. Fritch, 962-3 Monadnock Block, Chicago, Ill.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Secretary, C. W. Hunt, 220 West 57th Street, New York, N.Y. First and third Wednesday, except July and August, at New York.

AMERICAN SOCIETY OF ENGINEERING-CONTRACTORS.—President, George W. Jackson, contractor, Chicago; Secretary, Daniel J. Hauer, Park Row Building, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—29 West 39th Street, New York. President, Jesse M. Smith; Secretary, Calvin W. Rice.

WESTERN SOCIETY OF ENGINEERS.—1735 Monadnock Block, Chicago, Ill. J. W. Alvord, President; J. H. Warder, Secretary.

COMING MEETINGS.

CANADIAN ELECTRICAL ASSOCIATION.—July 6-7-8. Annual convention at Royal Muskoka Hotel, Muskoka Lakes, Ont. Secretary, T. S. Young, Confederation Life Building, Toronto, Ont.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION.—June 23-25. Annual meeting at Madison, Wis. Secretary, Henry H. Norris, Cornell University, Ithaca, N.Y.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS.—June 27-30. Annual convention at Jefferson, N.H. Secretary, R. W. Pope, 33 West 39th St., New York City.

AMERICAN SOCIETY FOR TESTING MATERIALS.—June 28-July 2. Annual meeting at Atlantic City, N.J. Secretary, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

THE ROYAL ARCHITECTURAL INSTITUTE OF CANADA.—August 24-27. Annual meeting at Winnipeg, Man. Alcide Chausse, Hon. Secretary, 5 Beaver Hall Square, Montreal, Que.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—May 31-June 3. Spring meeting at Atlantic City, N.J. Secretary, Calvin W. Rice, 29 West 39th St., New York City.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—June 1-3. Annual convention at Harrisburg, Pa. Secretary, E. R. Dasher, Gilbert Bldg., Harrisburg, Pa.

MASTER CAR BUILDERS' ASSOCIATION.—June 15-17. Annual convention at Atlantic City, N.J. Secretary, Jos. W. Taylor, 390 Old Colony Bldg., Chicago, Ill.

AMERICAN FOUNDRYMEN'S ASSOCIATION.—June 7-9. Annual convention at Detroit, Mich. Secretary, Richard Moldenke, Watchung, N.J.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—June 20-22. Annual convention at Atlantic City, N.J. Secretary, Jos. W. Taylor, 390 Old Colony Bldg., Chicago, Ill.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—June 21-24. Annual convention at Chicago, Ill. Secretary, Chas. W. Hunt, 220 West 57th St., New York City.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS.—June 22-24. Semi-annual meeting at Niagara Falls, N.Y. Secretary, J. C. Olsen, Polytechnic Institute, Brooklyn, N.Y.

CANADIAN GAS ASSOCIATION will meet at Hamilton, Ont., on June 9-10-11th. Secretary, Mr. A. W. Moore, Woodstock, Ont.

CANADIAN GAS EXHIBITORS will meet in the Alexandria Rink, Hamilton, Ont., June 6th to 11th. Secretary, A. W. Smith, 52 Adelaide Street East, Toronto.

THE AMERICAN PEAT SOCIETY will meet at Ottawa, Ont., July 25-26-27, 1910.

NEW ENGLAND WATER WORKS ASSOCIATION.—September 21-23. Annual meeting, Rochester, N.Y. Willard Kent, Secretary, Narragansett Pier, R.I.

AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—October 11-16. Seventeenth annual convention, Erie, Pa. Prescott Folwell, Secretary, 239 W. 39th Street, New York, N.Y.

NATIONAL MUNICIPAL LEAGUE.—November 14-18. Annual meeting, Buffalo, N.Y. Clinton Rogers Woodruff, Secretary, North American Building, Philadelphia, Pa.

TORONTO, CANADA, JUNE 3, 1910.

CONTENTS OF THIS ISSUE.

RAILWAY EARNINGS; STOCK QUOTATIONS.

Figures for the Past Week and from Beginning of Year, with Comparisons and Stock Prices.

The following table gives the latest traffic returns it is possible to obtain at the time of going to press:—

Road	Wk. Ended	1910	Previous Week	1909
C. P. R.	May 21	$1,812,000	$1,794,000	$1,492,000
G. T. R.	" 21	851,044	849,736	751,983
C. N. R.	" 21	286,600	283,000	171,600
T. & N. O.	" 21	25,247	22,171	25,996
Mont. St.	" 28	85,075	80,741	75,098
Halifax Elec.	" 21	3,497	3,499	3,312

Figures showing the earnings of Canadian roads since January 1st, this year and last, are appended:—

Road.	Mileage.	Jan. 1st to	1910.	1909.
C. P. R.	10,276	May 21	$32,824,000	$27,908,000
G. T. R.	3,536	" 21	16,482,971	13,682,699
C. N. R.	3,180	" 21	4,367,800	3,121,600
T. & N. O.	264.74	" 14	432,646	351,012
Montreal St.	141.79	" 28	1,674,670	1,442,237
Toronto St.	114	Mar. 31	974,264	861,768
Halifax St.	13.3	May 21	72,125	63,303
London St.	33.25	Apr. 30	73,864	69,327

Stock quotations on Toronto, Montreal and London exchanges, and other information relative to the companies listed in the above tables, are appended. The par value of all shares is $100.

Co.	Capital 000's omitted.	Price May 27 1909.	Price May 18 1910.	Price May 26 1910.	Sales last week.
C P. R.	$150,000	-179½	193-	-197	2,550
Mtl. St.	18,000	214-213½	243-242¾	244¾-244	735
Toronto St.	8,000	-124	.....	.....	248
H'fax Elec.	1,400	115-	124-123	125-123	11
G. T. R.	226,000	1st pref. 110¾; 3rd pfd. 67⅛; com. 32⅜			

CANADIAN PACIFIC RAILWAY

Following are figures relating to the operation of the Canadian Pacific Railway from July 1st, 1909:—

	Earnings. $	Expenses. $	Net Profits. $	Net Increase over 1908-9. $
April	7,985,230.00	5,004,119.00	2,981,111.00	837,604.00
March	7,796,337.00	5,085,164.00	2,711,173.00	907,465.00
February	5,992,052.14	4,505,032.90	1,487,019.24	724,874.46
January	6,104,426.90	4,787,830.51	1,316,596.39	926,846.56
December	8,214,758.04	5,099,334.94	3,115,423.10	918,671.53
November	9,075,963.93	5,383,625.98	3,692,337.95	1,471,258.60
October	9,744,596.87	5,358,299.68	4,386,297.19	1,731,030.48
September	8,323,178.03	4,891,288.86	3,431,889.17	1,317,281.40
August	7,426,984.62	4,462,926.75	2,964,057.87	385,159.16
July	7,140,029.93	4,660,159.20	2,479,870.73	205,297.48
Totals	$74,832,446.46	$49,237,781.82	$28,465,775.64	$9,425,488.67

CANADIAN NORTHERN RAILWAY

The following table gives the earnings, working expenses, etc., of the Canadian Northern Railway since July 1st, 1909:—

	Earnings. $	Expenses. $	Net Earnings. $	Net Increase over 1908-9. $
April	1,153,100	821,900	331,200	107,300
March	934,100	661,800	272,300	67,800
February	698,900	567,400	131,500	38,100
January	792,200	669,700	122,500	22,200
December	1,160,300	825,900	334,400	49,300
November	1,517,600	970,100	547,500	134,000
October	1,384,200	903,500	480,700	60,600
September	1,076,800	765,300	311,500	60,400
August	807,100	602,700	204,400	18,300
July	843,500	613,900	229,600	26,700
Totals	$10,367,700	$7,402,200	$2,966,500	$585,500

Mileage:—1910, 3,180; 1909, 3,094.

ONTARIO ELECTRIC RAILWAYS.

Cornwall Street Railway.

From week to week we propose to give, on our page devoted to transportation interests, particulars of the equipment, mileage, and other information regarding the railways of Canada, together with a list of the officials. This series of articles commenced in our issue of October 1st.

Previously given:—

Brantford and Hamilton Railway.
Chatham, Wallaceburg and Erie Railway.
Guelph Radial Railway.
Galt, Preston and Hespeler Railway.
London Street Railway.
International Transit Co., Sault Ste. Marie.
Kingston, Portsmouth & Cataraqui Elec. Ry., Kingston.
Toronto and York Radial Railway.
Windsor, Essex and Lake Shore Railway.
Ottawa Electric Railway.
Southwestern Traction Co., London.
Toronto Street Railway.
Niagara, St. Catharines and Toronto Railway.
Peterborough Radial Railway.
Berlin and Waterloo.
Sarnia St. Ry. Co.
Toronto Suburban St. Ry. Co.
Hamilton Street Railway.
Port Arthur and Fort William Electric Railway.

ELECTRIC RAILWAYS IN THE PROVINCE OF QUEBEC, CANADA

THE MONTREAL TERMINAL RAILWAY COMPANY

Kind of Road: Electric.

Length of Road: Single track, 13.56 miles.
Double track, 4.66 miles.
Branch and yards, 7.33 miles.
Total in single miles, 30.21.

Character of Service: Passenger and Freight.

Number of cars, 37.
Type, 23 open, 14 closed.
Number of motors, 64.
Power of motors, 30-40 h.p.
Method of controlling, hand.
Method of braking, hand.
Gauge of track, 4 ft. 8½ inches.
Weight of rails, 56-80 tee.

Power:

Direct Current.
Trolley voltage, 575.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

Copies of these orders may be secured from the Canadian Engineer for a small fee.

10611—May 12 and 13—Ordering that the Railway Company concerned in the crossing at the following point be relieved for the present from providing further protection at the crossing named, it appearing from an inspection made by the Board's Engineer and Operating Department, and from plans furnished, that the view at the crossing is excellent from both directions; that the crossing signboard is properly placed, and that there are whistling posts on the railway: C.P.R. crossing at west end of station yard at Manitou, Manitoba.

10612—May 12 and 13—Authorizing the Grand Trunk Pacific Branch Lines Company to cross at grade the Wetaskiwin Branch of the C.P.R. at Camrose, Alberta.

10613—May 12 and 13—Authorizing the Grand Trunk Pacific Branch Lines Company to cross at grade the track of the Lacombe Branch of the C.P.R. at Alix, Alberta.

10614—May 12 and 13—Directing that the crossing of Main Street, Kenora, by the C.P.R. be protected by a subway, to be constructed by the Railway Company.

10615—May 16—Authorizing the C.N.O.R. to divert a street lying adjacent to the north boundary of the right-of-way of the C.N.O.R., between Main Street and Cobbledick Street, Orono, Ontario.

10616—May 17—Authorizing the C.N.O.R. to divert and construct its railway across the side road between Lots 32 and 33, Concession 2, Township of Cramahe, County Northumberland, Ont.

(Continued to Page 572.)

CONSTRUCTION NEWS SECTION

Readers will confer a great favor by sending in news items from time to time. We are particularly eager to get notes regarding engineering work in hand and projected, contracts awarded, changes in staffs, etc. Printed forms for the purpose will be furnished upon application.

TENDERS PENDING.

In addition to those in this issue.

Further information as to Construction News under this heading may be had by writing our Toronto Office.

Place of Work.	Tenders Close.	Issue of.	Page.
Winnipeg, Man., railway bridge work	June 28.	May 6.	457
Regina, Sask., sewage disposal.	June 6.	May 20.	52
Girvin, Sask., telephone line....	July 15.	May 20.	514
Florenceville, N.B., bridge	June 13.	May 20.	514
North Bay, Ont., railway construction	June 8.	May 27.	48
Ottawa, Ont., departmental building	June 14.	May 27.	546
Victoria, B.C., brick house	June 6.	May 27.	541
Coquitlam, B.C., transmission line	June 6.	May 27.	541
Sault Ste. Marie, Ont., wharf extension	June 20.	May 27.	540
Maria, Que., wharf extension....	June 20.	May 27.	540
Montreal, Que., post-office fittings	June 6.	May 27.	540
Fraserville, Que., armory	June 13.	May 27.	540
Angers, Que., wharf construction	June 17.	May 27.	540
Kingsport, N.S., pier extension..	June 13.	May 27.	540
Joggins, Que., breakwater extension	June 10.	May 27.	540

TENDERS.

Dublin Shore, N.S.—Tenders will be received until June 17th for the construction of a breakwater. Napoleon Tessier, Secretary, Public Works Department, Ottawa.

Liscomb, N.S.—Tenders will be received until June 24th for an extension to the wharf. Napoleon Tessier, Secretary, Department of Public Works, Ottawa.

Lennox Island, P.E.I.—Tenders will be received until June 27th for the construction of a wharf. Napoleon Tessier, Secretary, Department of Public Works, Ottawa.

Moncton, N.B.—Tenders will be received until June 17th for the construction of a brick and stone school building. F. Neil Brodie, Architect, St. John; F. A. McCully, Sec'y. Board of School Trustees, Moncton.

St. John, N.B.—Tenders will be received until June 9th for dredging Miramichi Bay. Napoleon Tessier, Secretary, Department of Public Works, Ottawa.

St. John, N.B.—Tenders will be received up to 4 p.m., Wednesday, 1st June, for the following supplies for the Water and Sewerage Department: 100,000 bricks, 500 barrels of cement, 40 main stop-cock vault covers, 60 sewer manhole covers, 20 catch-basin frames, 20 tons special cored castings.

Montreal, Que.—Tenders will be received until June 9th for the construction of a sewer. J. R. Barlow, City Surveyor, City Hall.

Cobourg, Ont.—Tenders will be received until June 13th for concrete walk construction. D. H. Minaker, Town Clerk.

Coldwater, Ont.—Tenders will be received until June 18th for the installation of a cast-iron supply main and distribution system, and for the construction of a reservoir and collecting mains. J. K. Russell, Clerk; John Galt Engineering Co., Toronto, Consulting Engineers.

Chatham, Ont.—Tenders will be received until June 15th for the construction of two iron and concrete bridges. T. R. Clark, Commissioner, North Buxton.

Georgetown, Ont.—Tenders are invited for a reinforced concrete, three-storey, 260 x 64, mill building. L. E. Fleck.

London, Ont.—Tenders for pavement will be received up to Monday, June 6th, for an asphalt pavement on Ridout Street, from King Street to York Street. A. O. Graydon, City Engineer.

Orillia, Ont.—Tenders will be received until June 4th for all the work and material (with hot-water heating), required in the erection of a public library building. W. H. Croker, Architect.

Peterboro', Ont.—The Canadian Leonard Co. are in the market for 80 tons of ½-inch to 1¼-inch rounds, from 4 to 58 feet long, medium and high steel.

St. Catharines, Ont.—Tenders will be received up to 6 p.m. Wednesday, June 15, for the construction of a new wing to the St. Catharines General and Marine Hospital. Langley & Howland, Architects, Continental Life Building, Toronto. J. B. M'Intyre, Secretary.

Toronto, Ont.—Tenders will be received until June 3rd for fifty-foot bridge and abutments, concrete abutment for two bridges, concrete box culvert, 10-foot opening. Bowman & Connor, 36 Toronto St.

Winnipeg, Man.—Tenders will shortly be invited for the construction of three archways at Armstrong's Point, estimated to cost $12,000. M. Peterson, Secretary, Board of Control.

Winnipeg, Man.—Tenders will be received until June 14th for the erection of two Technical High schools. R. H. Smith, Secretary-treasurer, W.P.S.B.

Calgary, Alta.—Tenders will be received for Calgary Power Company, Limited, up to noon on Wednesday, June 8th, for the construction of Calgary Terminal Station, by Smith, Kerry & Chace, Engineers, Bank of B. N. A. Bldg.

Calgary, Alta.—Tenders will be invited almost immediately for the completion of the city hall, estimated to cost $126,000, and for a telephone conduit system to cost $40,000. J. T. Child, City Engineer.

Prince Albert, Sask.—Tenders will be received until June 11th for two return tubular boilers, 72 inches by 18 feet, to maintain a working pressure of 150 pounds per square inch. C. O. Davidson, City Clerk.

Regina, Sask.—Tenders will be received until June 5th for the erection of an office building. Storey & Van Egmond, Architects, Regina.

New Westminster, B.C.—Tenders are required for laying and joining about 14 miles of 25-inch rivetted steel water-main and about 7,780 feet of 12-inch and 7,500 feet of 13-inch lap-welded pipe. Plans and specifications can be obtained from the City Engineer by 6th June. W. A. Duncan, City Clerk.

Vancouver, B.C.—Tenders will be received up to Friday, June 10, at Stewart, B.C., by the Cassiar Construction Co., Limited, for clearing and grading about 15 miles of the Portland Canal Short Line Railway. Profiles and specifications can be seen at the office of the company. W. H. Grant, General Manager.

Victoria, B.C.—Tenders will be received until June 8th for new schools at Ellison and Larkin. F. C. Gamble, Public Works Engineer.

Victoria, B.C.—Tenders will be received until June 13th for a lock-up and Government offices at Stewart. F. C. Gamble, Public Works Engineer.

CONTRACTS AWARDED.

St. John, N.B.—The following tenders for cast iron pipes were received: Watson, Jack & Co., Montreal, $28.20 per ton; Stavely Coal and Iron Co., $29.15 per ton; W. Beverly Robinson, $29.80 per ton; D. Y. Stewart & Co., $30.30 per ton; Vroom & Arnold, $31 per ton; H. A. Drury Co., Ltd., $31.55 per ton. The tender of Watson, Jack & Co. was accepted. Tenders for terra cotta sewerage pipes were received

from C. H. Peters Sons, Ltd., J. Willard Smith and Jas. Robinson Co., Ltd. The contract was awarded to Messrs. Peters, whose tender was the lowest, as follows: 300 feet 15 inch, 52c. per foot; 1,200 feet 12 inch, 33c. per foot; 800 feet 9 inch, 22c. per foot; 200 feet 6 inch, 13c. per foot; 30 feet 12 x 6 junctions, $1.40 each; 30 feet 9 x 6 junctions, $1.00 each; 30 feet 6 x 6 junctions, 75c. each.

Outremont, Que.—For the construction of approximately 5,000 feet of trunk sewer, W. Duquette, of Montreal, was awarded a contract at $29,664.

Quebec, Que.—The L. H. Gandry Co., of Quebec, were awarded a contract for 250 tons of cast iron pipe at the following prices: 4-inch, $31.40; 6-inch, $30.55; 8-inch, $29.90; 10-inch, $29.90; 12-inch, $29.90; 14-inch, $29.90.

Montreal, Que.—Contracts which will total about one million dollars have been recommended for acceptance as follows: Supplying asphalt—Barber Asphalt Company, the lowest tenderer; macadam—Laurin, Leach & Co.; laying curbstones—Joseph Mandeville; supplying and laying of blue-stone flags—F. B. Lawrence; supplying material for asphalt sidewalks—Sicily Asphalt Co., 30,000 yards—Bitulithic Paving Co., 20,000 yards; supplying cement, Assam Paving Co.; supplying asphalt blocks—Ludger Gravel; laying asphalt—Warren-Quinlan Asphalt Company—granite blocks, Sicily Asphalt Co; scoria blocks—F. J. Lawrence.

Westmount, Que.—The Canada Mineral Rubber Co., Ltd., of Toronto, were awarded a $115,396 contract for paving work in Westmount last week, while a second award was made to the Warren-Quinlan Co., at $85,776.

Brantford, Ont.—For the construction of concrete abutments for a steel bridge, the Township of Onondaga have awarded a contract to Winger & Winger, of Springvale, Ont., at $7.15 per cubic yard.

Brantford, Ont.—Jas. Faulkener, of Brantford, secured the contract for the Ryerson School extension, at $12,461, while P. H. Secord & Sons, a local firm, were awarded the King Edward School extension contract at $17,298.

Brockville, Ont.—Haggarty & Co. were given the contract for the construction of six reinforced concrete bridges in this town. Following is a list of the bids received:

	Concrete Throughout.	Concrete Abutments. Steel Superstructure.
Haggerty & Co.	$15,950	$15,950
W. M. Leacy	16,790	16,760
Elliott & Riley	17,330	17,200
Helmer & Wenstonley	17,220	17,600
J. E. Hayes	18,180	.....
R. McManus & Co.	18,610	18,750
Oakville Construction Co.	22,440	21,590

Barber & Young, Toronto, are Consulting Engineers.

Mount Hamilton, Ont.—F. Taylor & Bros., of Hamilton, were given a contract by this township for the construction of concrete bridges. Tenders were: F. Taylor & Bros., $6,405; Chas. Brayley, $6,855; Thos. Barnes, $7,000.

Newmarket, Ont.—Following is a list of tenders received for the construction of a reinforced concrete arch bridge of 60-foot span over the Holland River: Fraser & Clemens, New Hamburg, $3,300; John A. Watson, Laskay, $3,453; Rutherford & Patten, St. Catharines, $3,720; E. C. Lewis, Toronto, $3,996; Cement Products, Toronto, $4,190. Town council decided to do the work by day labor. Barber & Young, of Toronto, are the consulting engineers.

Oshawa, Ont.—W. G. Gibson, of Port Hope, was awarded a contract by East Whitby Township for the construction of two reinforced concrete bridges of 32 and 22 foot spans. Contract prices were $1,055 and $1,045. Bowman & Connor, Consulting Engineers, Toronto.

Ottawa, Ont.—The contract for the diversion of the Intercolonial Railway, near Chatham, N.B., with a view to eliminating the present heavy grade between Loggieville and Nelson, and giving better railway facilities at Chatham, has been let in part to Morrison & Clark, of Summerside, P.E.I. The whole work involves an expenditure of about half a million dollars, and the construction of about 8½ miles of railway. It is understood that the contract awarded to Morrison & Clark is in the neighborhood of $200,000.

Toronto, Ont.—The Bishop Construction Co. and C. W. Wood have contracts for the construction of reinforced concrete buildings for the Canada Linseed Oil Mills Co., who will establish a plant here. J. H. Tromanhauser will build a fireproof elevator, the first of its kind to be erected in Toronto.

Toronto, Ont.—Allis-Chalmers-Bullock, Limited, of Montreal, were awarded by the Board of Control the contract for the centrifugal pumps and electric motors for the Sunnyside sewage system, at $3,215.

Toronto, Ont.—The Board of Education accepted the following tenders for the enlargement of Roden School: Masonry, R. Chalkley & Son, $10,387; carpentry, W. Williamson, $8,965; reinforced concrete, A. Gardner & Co., $4,400; roofing and tinsmithing, George M. Bryan, $975; structural steel work, W. H. Salter, $995; plastering, T. Blackburn & Son, $1,895; painting, Taylor & Co., $1,100; plumbing, Keith & Fitzsimons, $1,330; heating and ventilating, Keith & Fitzsimons, $5,600; heat regulating, Johnston Temperature Co., $860. The following tenders were also accepted for the erection of the new Elizabeth Street School: Masonry, R. Chalkley & Son, $24,948; carpentry, Frank Armstrong, $9,789; reinforced concrete, W. Gardner & Co., $4,977; roofing, A. B. Ormsby & Co., $906; structural steel work, W. H. Salter, $2,380; plastering, T. Blackburn & Son, $2,405; painting, James Phinnemore, $1,615; plumbing, Keith & Fitzsimons, $1,750; heating and ventilating, Keith & Fitzsimons, $6,000; heat regulating, Johnston Temperature Co., $800.

Winnipeg, Man.—Board of Control decided to purchase a "Linkvelt" mixer for paving work, at an estimated cost of $8,000.

Winnipeg, Man.—In connection with the municipal power development scheme, the Board of Control have recommended acceptance of the following tenders, as advised by the consulting engineers: 280,000 duct feet of single duct, at $7.82 cents a duct foot, f.o.b. Winnipeg, total, $21,896, the Northern Electric and Mfg. Co.; construction of McPhillips Street substation, $11,423.79, J. W. Astley, engineer of construction; equipment of substation, including three transformers of 1,500 k.w. gross capacity, $29,616, Canadian Westinghouse Co.; construction of conduit runs, $36,925, G. M. Gest, Montreal.

Prince Albert, Sask.—John Craig, at $18,960, was the successful bidder for the construction of waterworks and sewer extension in this city.

Vancouver, B.C.—Evans, Coleman & Evans were awarded a contract for 1,600 feet of water pipe. The tenders were as follows: Evans, Coleman & Evans, for July delivery, $51.25 per ton; September delivery, $42.60. Robertson-Godson Company, July delivery, $52.60; September, $42.25. C. Gardiner, Johnson & Company, September delivery, $42.95.

Vancouver, B.C.—Burnaby Council accepted the tender of the Dominion Wood Pipe Co. for the laying of pipe and the construction of a water tower for Edmond's waterworks system, the price being as follows: Supplying and laying 6-inch wood pipe, 45 cents per foot; 4-inch pipe, 32¼ cents per foot. Tank and tower on foundation to be built by council, $3,715.

Victoria, B.C.—Sabin & Stevens, a local firm, secured the contract for clearing the right-of-way for the Comox extension of the Esquimalt and Nanaimo Railway between Union Bay & Oyster River.

Victoria, B.C.—The Pacific Coast Construction Co. secured the award for wharf extension work in this city at $4,333. Other tenders were: J. D. McDonald & Son, $4,497; W. McDonald, $4,673; Sheppard & Jones, $5,750.

Victoria, B.C.—Tenders have been received for asphalt paving work from the Warswick Paving Company, the Barber Paving Company, of Seattle, the Pacific Paving Company, Albert Pike and City Engineer Smith. The streets which it is intended to improve with asphalt pavements this year are Cook, from Pakington to May; St. Charles, from Fort to Rockland Avenue; Southgate, from Vancouver to Cook; and Linden Avenue, from Fort to Dallas Road. The Warswick Company submitted the following bids: Cook, $30,850.07; St. Charles, $12,904.50; Southgate, $5,681.20; Linden Avenue, $42,566.72. Albert Pike tendered on but one street—St. Charles, at $20,558.60. The Pacific Paving Company did not submit a tender in bulk sum. The City Engineer's tenders were as follows: Cook, $34,312.00; St. Charles, $16,997.50; Southgate, $7,330.60; Linden, $45,475.00. The tenders will be considered at the next meeting of the streets committee.

RAILWAYS—STEAM AND ELECTRIC.

Montreal, Que.—The Grand Trunk Railway placed orders on Tuesday for nearly $2,000,000 worth of new rolling stock. This is in addition to the orders placed ten days ago. The equipment includes half a dozen first-class coaches, twenty baggage cars, one motor car, three dining cars, three cafe parlor cars, three buffet parlor cars, fifteen Richmond Consolidated freight engines, twenty-five Mogul locomotives, 1,000 hopper-bottom steel coal cars, capacity 100,000 lbs. each, and 500 steel under-frame box cars, 60,000 lbs. capacity. The orders for the cars have been placed with the Canada Car Company, the Silliker Car Company, of Halifax, and the company's own car shops at Point St. Charles.

Ottawa, Ont.—The Canadian Northern Railway Company has filed with the Railway Commissioners for approval detailed plans for the entrance into the city of the company's new line from Toronto to Montreal.

Port Arthur, Ont.—A Canadian Northern survey party at work since last August locating a line between the clay belt north of Lake Nepigon and Port Arthur for the Port Arthur-Sudbury line, has returned. They report success in getting a route and a grade that is satisfactory.

Lethbridge, Alta.—Reginald E. McArthur, consulting engineer, is putting a survey party in the field to locate a line of railway from Cassils on the C. P. R. main line to Bow City, where the Bow Centre collieries are situated.

Regina, Sask.—The C. P. R. and C. N. R. have reached an agreement respecting a union station here, and it is expected that the work of construction will commence shortly.

Vancouver, B.C.—Mackenzie, Mann & Company are calling for tenders for the building of the first 60 miles of their road in British Columbia. This construction will be from the coast eastward. Tenders are also being asked for a railway between Virginia and Duluth, in Minnesota, a distance of about 75 miles. The construction of the Virginia-Duluth line will give the C. N. R. close connections with the Chicago and Northwestern Railway at Chicago. It will also give them a through line from Duluth to Winnipeg and the West.

LIGHT, HEAT AND POWER.

Montreal, Que.—In a letter to the city on Monday, the Montreal Light, Heat and Power Co., through General Manager Norris, expressed a desire to be relieved from the service of lighting the streets. The company also gave notice that it would terminate the present arrangement on October 31, and declared that it would rent their pole lines to the city were a municipal service decided on. The Board of Control decided to call for tenders for street lighting.

Medicine Hat, Alta.—M. A. Maxwell has reported favorably on the installation of a municipal electric light and power plant, at an approximate cost of $50,000.

Point Grey, B.C.—The Council and the B. C. Electric Railway Co. have entered into an agreement whereby the latter will supply electric light for ten years. Five hundred lamps will be installed.

BY-LAWS AND FINANCE.

Farnham, Que.—The $100 000 by-law for the development of water power was carried on May 25th.

Bowmanville, Ont.—Ratepayers passed municipal ownership of the electric light plant.

Ingersoll, Ont.—Two by-laws; one to raise $39,800 to acquire the plant of the Ingersoll Electric Power & Light Company, and the other for $15,000 to make improvements and extensions to the plant, were carried.

St. Catharines, Ont.—Sewer by-law was defeated.

New Hamburg, Ont.—Voters decided to purchase and operate the electric light plant.

Peterboro', Ont.—Ratepayers sanctioned the expenditure of $30,000 new sewers.

Toronto, Ont—Thos. Crawford, 333 Confederation Life Building, invites tenders until June 4th, for $16,000 Public school debentures issued by Scarboro' Township.

Welland, Ont.—On June 20th the ratepayers will vote on a $60,000 waterworks improvement by-law.

Moose Jaw, Sask.—On June 17th, the ratepayers will vote on the following money by-laws:—Extension of electric light system, $35,000; improvement of exhibition grounds, $10,000; erection of produce, hay and stock market, $30,000; erection of an isolation hospital, $15,000; sub-fire station, $10,000.

Dauphin, Man.—The following debenture by-laws will be submitted to the ratepayers on June 4th:—$11,000, electric light; $6,000, general hospital; and $12,000, school.

Calgary, Alta.—Ratepayers carried a $126,000 by-law to complete the city hall, and another of $40,000 to lay a conduit system for telephone wires. Tenders for the work will be invited almost immediately.

Red Deer, Alta.—On June 20th, the ratepayers will vote on the following by-laws: $4,000, new pump; $500, fire hose; $2,500, concrete sidewalks.

Kamloops, B.C.—A $40,000 by-law to improve the water supply, by building a new reservoir and laying new mains, has been given a six months' hoist.

Point Grey, B.C.—In addition to the $500,000 water by-law now under consideration by council, one for a $250,000 sewerage system will be introduced.

Vancouver, B.C.—Council is considering a $500,000 sewer by-law.

SEWERS, SEWAGE AND WATERWORKS.

St. John, N.B.—Ratepayers of Fairville will vote on a sewerage system.

Montreal, Que.—George Janin will report against the proposal to bring water from the Laurentian Mountains.

London, Ont.—H. J. Glaubitz, consulting engineer, will probably recommend to the Water Commissioners the installation of a $10,000 pump.

Toronto, Ont.—The city will extend the water mains and provide additional hydrants for improving the fire protection in the vicinity of the Parliament Buildings. The cost, $7,000, will be paid by the Province.

Toronto, Ont.—The Waterworks Department requires meters estimated to cost $20,000.

Victoria, B.C.—It is probable that a sewerage system will be installed in Esquimalt at an early date.

CURRENT NEWS.

Ottawa, Ont.—Wm. Foran, Secretary of the Civil Service Commissioners of Canada, will receive until June 15th, applications for the following vacant positions:—

1. An engineer for structural steel work, Department of Public Works, Chief Architect's Branch, Subdivision B of the First Division, initial salary $2,100. Candidates must be graduates of a recognized university or school of engineering, and must have had a practical training of at least five years in the office or works of some recognized structural steel company. They must be capable of designing and superintending the construction of structural steel work, particularly in connection with the erection of buildings.
2. Four architectural draughtsmen, Department of Public Works, Chief Architect's Branch.

Welland, Ont.—Council will consider the appointment of a town engineer at its next meeting.

MISCELLANEOUS.

Montreal, Que.—The Canadian Pacific Railway Company have decided to rebuild and double-track their big bridge over the St. Lawrence at Lachine, just above Montreal. The company's engineers are now working on the plans. The work will probably cost in the neighborhood of $1,500,000.

Montreal, Que.—Plans for improvements to the harbor, outlined in recent issues, have been formally approved by the Minister of Marine, and Fisheries at Ottawa. Two million dollars will be expended this season.

Hamilton, Ont.—The Dominion Power & Transmission Company have plans under consideration to erect a car-building plant here to manufacture cars and equipment for the local street railway and suburban lines controlled by it.

St. Catharines, Ont.—It is said that the construction of a high-level bridge across the old Welland canal is now assured.

Owen Sound, Ont.—English capitalists have decided to construct a million-dollar shipbuilding plant at Owen Sound.

Vancouver, B.C.—Council have decided to pave Granville Street from the city boundary to the Fraser River. The work will cost about $50,000.

PERSONAL.

Mr. G. H. Power, of Chipman & Power, consulting engineers, Mail Building, Toronto, has returned to Toronto, after an extended trip through Western Canada.

Mr. R. E. W. Hagarty, B.A.Sc., has returned from a business trip to Great Britain and the Continent.

Mr. C. E. Cartwright, M. Can. Soc. C.E., division engineer of the Canadian Pacific Railway at Vancouver, B.C., has resigned that position and will shortly open an office at 503 Cotton Building, in the same city, where he will carry on a consulting practice. Mr. Cartwright, whose valuable experience will count for much in his new work, will make a specialty of railway construction, wharves, bridges and land improvement.

Mr. John Irving, trainmaster for the Grand Trunk Railway for many years on the division between Toronto and Belleville, has resigned, to accept a position with the Canadian Northern as divisional superintendent at Winnipeg.

Mr. J. P. Forde, for a number of years resident engineer on the C.P.R. at Revelstoke, has been appointed supervisor of construction of the Canadian Northern Railway in the province by the British Columbia government.

Dr. Chas. A. Hodgetts, who was recently appointed head of the health branch of the Dominion Commission on Conservation, has been awarded a fellowship in the Royal Sanitary Institute of London, England, in recognition of his noteworthy work as secretary of the Provincial Board of Health of Ontario.

OBITUARY.

Mr. J. Emmanuel Beuchemin, a well-known contractor of Sorel, died last Tuesday, at the age of 59 years. He had the Government contract for the construction of wharves at Sorel.

Mr. James Bruce Spence, Chief Draughtsman of the Railways and Canals Department, died suddenly at Ottawa, May 20th. He was nearly seventy-eight years of age. The late Mr. Spence was born at Balmande, County of Aberdeen, Scotland, in 1832 and came to Canada when 25 years of age, taking up immediately his chosen profession of engineering, becoming engaged in the construction of Canada's earliest railroads, chiefly the Great Western, now the Grand Trunk, and having been associated with such eminent engineers as George Low Reid, Joseph Hobson and John Page.

He came to Ottawa 34 years ago to become associated with the Railways and Canals Department, and in this connection has been one of Canada's best and most trusted employees. One of his notable works was the designing and supervising of the Soo canal, having the largest single lock in the world.

Here it was that electricity was used for the first time in connection with opening and closing of the gates, the result of which was watched with interest by the engineering world. It was a complete success from the start, standing to this day a monument to this capable, but modest, engineer, handling the ever-growing traffic without delay and without mishap.

In all Mr. Spence's years of responsible service to Canada, he discharged his duties quietly, fearlessly and well. In the passing of Mr. Spence the Civil Service loses one of those army of faithful workers, who are serving Canada with their very best, but with whom the general public seldom comes in contact.

Mr. Spence was a member of the Canadian Society of Civil Engineers.

Mr. John W. Stoughton, 67 years old, famous as the builder of the Victoria Bridge, which spans the St. Lawrence River at Montreal, died at Detroit, Mich., on Tuesday. Mr. Stoughton was erection superintendent of the Dominion Bridge Company, of Walkerville, Ont.

Mr. William Richard Tiffin died on Tuesday night, May 29th, at Barrie, in his 65th year. On May 24 Mr. Tiffin celebrated his 50th anniversary with the Grand Trunk. As a lad of 15, he entered the office of the Superintendent of the Great Western, at Hamilton, as junior clerk, and afterwards served in a similar capacity in London. On the opening of the Wellington, Grey and Bruce he was appointed traffic agent at Fergus, in 1872. When the line was completed he went to Palmerston, as Divisional Superintendent, and on the amalgamation of the Great Western with the Grand Trunk, went to Stratford in 1886 as Superintendent of the northern division. In 1891 Mr. Tiffin went to London in charge of the southern division, and when the change of management took place in 1897 was transferred to the northern division at Barrie, which division he managed with signal success. In railroad circles Mr. Tiffin was regarded as one of the best-informed railway men in Canada, and possessed administrative ability of a high degree.

ORDERS OF THE RAILWAY COMMISSIONERS OF CANADA.

(Contitnued from page 568).

10617—May 6—Authorizing the Commissioners of the Transcontinental Railway to cross the railway line and tracks of the C.N.R. (Dundee Branch) at grade, by and with a spur line to gravel pit from main line of the National Transcontinental Railway, through Sections 1, 2, 11, and 12, R. 4, East, Manitoba.

10618—May 12 and 13—Dismissing the complaint of the Manitoba Windmill and Pump Company, complaining that the rates charged by the C.P.R. on windmills from Brandon, Man., to Vancouver, B.C., are unjustly discriminatory in favor of the shippers from Eastern Canada.

10619—May 17—Approving location of the G.T.P. Branch Lines Company's Battleford Branch from mile 0 to mile 26, Sask.

10620—May 12 and 13—Authorizing the G.T.P.R. to divert highway crossing in the south half of Section 18, Township 12, R. 20, west 1st Meridian, District of Brandon, Manitoba.

10621—May 17—Approving revised location of the V. V. & E. Railway and Navigation Company's line of railway from the East line of Section 15, Township 16, to the West line of Township 26, New Westminster District, B.C., a distance of 18.3 miles.

10622—May 17—Authorizing the C.P.R. to construct Bridge No. 106.44 over Windy Lake, on Cartier Section, Lake Superior Division.

10623—May 17—Authorizing the C.P.R. to construct Bridge No. 26.9 over Lavalle Creek, on the Chalk River Section, Eastern Division.

10624-625—May 16—Authorizing the G.T.R. to cross at grade with its railway, the road between Lot 11, 2nd Concession, and Lot 11, 3rd Concession, Township of Tiny, County Simcoe, Ont., and the public road between Lots 85 and 86, 2nd Concession Township Tiny, County Simcoe, Ontario.

10626—May 16—Authorizing the G.T.R. to construct its railway by means of an overhead bridge, across road between Lots 89 and 90, 1st Concession Township Tiny, County Simcoe, Ont.

10627—May 16—Authorizing the G.T.R. to cross at grade with its railway the road between Lot 88, 1st Concession, and Lot 88, 2nd Concession Township Tiny, County Simcoe, Ontario.

10628—May 16—Authorizing the G.T.R. to construct its railway at grade across the road between Lots 11 and 12, 2nd Concession of Township of Tiny, County Simcoe, Ontario.

10629—May 17—Authorizing the town of Paris, Ontario, to lay a ten-inch iron pipe along Market Street, under the two tracks of the main line of the G.T.R.

10630—May 16—Authorizing the Manitoba Government Telephones to erect wires across the track of the C.N.R. at public crossing 1½ miles east of Swan Lake Station, Manitoba.

Re-Rolled Steel Rails

200 tons - - 56 lbs.
100 tons - - 70 lbs. (Seconds)

FOR SALE

Provincial Steel Co.
COBOURG, - - ONTARIO

10632—May 17—Authorizing the Government of the Province of Alberta to erect its wires across the track of the C.N.R. between Sections 25 and 26, Township 55, Range 20, west 4th Meridian, Alberta.

10632-33—May 17—Authorizing the corporation of the city of St. Thomas, Ontario, to erect wires for the transmission of electrical power and energy across the telegraph lines and across the track of the London & Port Stanley Branch of the P.M.R., at two different points in St. Thomas.

10634-35-36—May 17—Authorizing the municipal corporation of the city of St. Thomas, Ontario, to erect wires for the transmission of electrical power and energy across the lines of the Great North Western Telegraph Company at three different points in St. Thomas, Ont.

10637—May 17—Adopting and approving the "Standard Conditions and Specifications for Wire Crossings," approved by Order No. 8392, October 7th, 1909, pursuant to the amendment to Section 246 of the Railway Act, which reads as follows:—"5. An Order of the Board shall not be required in the cases in which telephone, telegraph, or electric light wires are erected across the railway with the consent of the company in accordance with any general regulations, plans, or specifications adopted or approved by the Board for such purposes."

10638—May 18—Granting leave to the C.P.R. to appeal to the Supreme Court of Canada from Order No. 10340, which directed the arrival and departure of trains of the Naniwaki Branch to and from a point at or near Sappers' Bridge, Ottawa, on the following terms and conditions:—1. That the appellants undertake to set appeal down for and expedite the hearing thereof at the present sittings of the Supreme Court. 2. That if not argued at these sittings for any reason that the appellants may be to blame for, then the appeal shall not operate as a stay of the said Order of the 26th of April, 1910, unless the Supreme Court otherwise orders.

10639—March 22—Approving the revised location of the N. St. C. and T. Railway between mileage 11.53 and 13, County Welland; authorizing the highway crossing of public road on north and south sides of the Canal Feeder, at Station 307.83, and 314.22, the public road at mile 11.97 on north side of the Government Raceway, and the town line between Lot 27, Township of Humberstone, and Lot 27, Township of Crownland; and authorizing the N. St. C. & T. Railway to cross with its tracks the tracks of the Canada Southern and the T. H. & B. Railway Companies at a certain point.

10640—May 17—Recommending to the Governor-in-Council for sanction the lease of the railways of the Georgian Bay & Seaboard Railway Company to the C.P.R. by Indenture dated the 1st day of January, 1910.

10641—May 17—Recommending to the Governor-in-Council for sanction By-law No. 96, imposing a penalty upon the officers and employees of the C.P.R. for failure to fulfil and keep "The General Train and Interlocking Rules" of the Company, rescinding and cancelling By-law No. 87.

10642—May 17—Refusing application to the Board for an Order directing the C.P.R. and the G.T.R. to honor each other's tickets between Toronto and Hamilton.

10643—May 17—Temporarily approving, pending the final determination by the Board, of the tariffs of tolls which the Bell Telephone Company shall be authorized to charge, and the form of agreement with other companies to the approved by the Board, the agreement between the Bell Telephone Company and the Euphemia Rural Telephone Association, of July 12th, 1907.

10641—May 18—Approving the location and detail plans of the C.P.R. station at Walsh, Alta.

10645—May 18—Extending, until the 15th of July, 1910, the time within which the C.P.R. was required by Order No. 10130 to make connection with its line of railway, and the G.T.R., at Galt, Ont.

10646—May 12—Directing that the C.P.R. within 50 days from the date of this Order, raise the barrel conveyor over its tracks at Keewatin to a height of not less than 22 feet, six inches, above base of rail.

10647—May 18—Extending, for a period of 60 days from date of this Order, the time within which the interlocking plant of the Mt. McKay & Kakabeka Falls Railway and the C.P.R. at Fort William, Ont., was to be installed.

10648—May 18—Extending, for a period of 60 days from date of this Order, the time within which the protective appliances shall be installed at the crossing of the Mt. McKay & Kakabeka Falls Railway and the C.P.R. at Yonge Street, Fort William, Ont.

10649—May 17—Directing the C.P.R. to put into effect, not later than the 6th of June, 1910, a rate not exceeding 14c. per 100 lbs. upon shipments of live stock, in carloads from Toronto to Smith's Falls.

10650—May 17—Approving Sup. No. 2 to the C.P.R. Company's Standard Freight Tariff, C.R.C., E-1244, applying between stations on its Orford Branch.

10651—May 18—Authorizing the C.P.R. to construct a bridge over Roger's Creek at Mile 132.5, E. & N. Railway, Alberni extension.

10652—May 18—Authorizing the Government of Alberta to lay a watermain under the track of the C.P.R. at production east of Cortland Street, Lethbridge, Alta.

10653—May 19—Directing that the rates on the Grand Trunk and C.P.R. on ex-lake western grain from lake or river ports to points in Ontario and Quebec, be the same for equivalent distances from all lake and river ports at which facilities exist for the transhipment of grain from vessels to cars, between Depot Harbor and Montreal inclusive; cost of transhipment to be included in the rates on grain transhipped to ports of destination. On such grain transhipped at ports west of Montreal, destined to points east of Montreal, to which points through rates are based on arbitraries, the western portion of said rates shall be based on St. Henri mileage in the case of the G.T.R., and on Outremont mileage in the case of the C.P.R., the tariffs covering rates called for herein to be effective not later than June 13th, 1910.

10654—May 17—Re-instating the application of the C.N.O.R. for authority to construct its railway across certain highways in the town of Smith's Falls; and rescinding Order of the Board, No. 10493, dated May 3rd, 1910, which dismissed said application.

10655—May 17—Re-instating application of the C.N.O.R. for approval of location of its railway through the County of Lanark, mile 29 to mile 41; and rescinding Order of the Board No. 10492, dated May 3rd, 1910, which dismissed said application.

10656—May 17—Dismissing application of the C.N.O.R. for authority to construct its railway across and divert public road on Lot 20, Concession 1, Township of Cramahe, County Northumberland, Ontario.

10657—May 17—Re-instating application of the C.N.O.R. for approval of the revised location of its railway through the town of Smith's Falls, from mile 38.2 to mile 42.1, and for authority to construct its railway across certain highways in the town of Smith's Falls; and rescinding Order No. 10494, dated May 3rd, 1910, which dismissed said application.

10658—May 19—Authorizing the C.N.O.R. to construct its railway across the public road between Lots 30 and 31, Concession "B," Township of Brighton, County Northumberland, Ontario.

10659—May 19—Directing that within ninety days from the date of this Order the G.T.R. shall install a Whyte Signal Electric Bell at the crossing of first level highway east of station at Ernestown, Ont.

10660—May 17—Directing that the C.P.R. do not permit any engine, tender, or car to stand on the freight house siding east of the east end of the freight house at the crossing of Ingersoll Avenue, Woodstock, Ont.

10661—May 25—Directing that the Pullman Company be added as a party to the proceedings in the matter of Sleeping Car Tolls under consideration by the Board.

10662—May 21—Approving location of the G.T.P. Branch Lines Company's Tofield-Calgary Branch from mile 150 to mile 197.8, near Calgary, Alberta.

10663—May 25—Approving location of the C.N.O.R. station grounds at Malvern, Township of Scarboro, Ont.

10664—May 23—Directing that the C.N.R. construct a suitable highway crossing over its line of railway where Wiegand Avenue produced in a straight line would intersect the line of the Railway Company in the city of Fort William.

10665—May 23—Granting leave to the C.N.O.R. to operate its trains across Division Street, in the Township of Hamilton, County Northumberland, Ont., temporarily, and for construction purposes only, pending the completion of the proposed subway.

10666—May 25—Approving the location of the station grounds of the C.N.O.R. at Orono, Ontario.

10667—May 26—Authorizing the N.C.R. to reconstruct drawbridge situate just east of the present Welland Station, Ont.

10668—May 26—Authorizing the C.N.O.R. to cross public road between Lots 20 and 21, Concession "B," Township Murray, County Northumberland, Ontario.

10669—May 26—Authorizing the C.P.R. to construct Bridge No. 58.93, on the White River Section, Lake Superior Division of its line of railway.

10670—May 26—Dispensing with publication of notice of application of the Atlantic and Lake Superior Railway Company for the sanction of agreement of sale entered into by the Royal Trust Company, and the Quebec Oriental Railway Company, dated May 19th, 1910.

10671—May 21—Authorizing the corporation of the town of Weyburn to lay a sewer and watermain under the track of the C.P.R. at Weyburn, Man.

10672—May 25—Authorizing the Government of the Province of Alberta, to lay a watermain under the track of the A. Railway and I. Company, at the point of junction with the C.P.R. on the road allowance at the north boundary of N. E. ¼ of Sec. 32-8-21, west 4th Meridian.

10673—May 25—Authorizing the Canadian Niagara Power Company to erect wires across the Bell Telephone Company at junction of Courtwright and Robinson Streets, Bridgeburg, Ont

10674—May 23—Authorizing the Camden Rural Telephone Company to erect wires across the track of the Bay of Quinte at the first crossing north of its station at Moscow, Ont.

10675—May 21—Authorizing the Bell Telephone Company to erect wires across the track of the London & Port Stanley Railway Company at public crossing two miles south of St. Thomas Station, Ontario.

10676—May 26—Authorizing the corporation of the city of Winnipeg to erect a conduit under the track of the C.P.R. at Higgins Avenue, in Winnipeg.

10677—May 26—Authorizing the corporation of the city of Winnipeg to erect a conduit under the track of the C.P.R. known as the "Royal Crown Soap Company's spur," where said spur crosses Higgins Avenue, in Winnipeg.

10678—May 26—Authorizing the corporation of the city of Winnipeg to erect a conduit under the track of the C.P.R. known as the "Princess Street Spur," where said spur crosses Higgins Avenue, Winnipeg.

10679—May 26—Authorizing the corporation of the city of Winnipeg to erect a conduit under the track of the Pembina, and Saskatchewan Branch of the C.P.R., and also under the spur track of the C.P.R. on Higgins Avenue.

10680—May 27—Authorizing the Montreal and Southern Company's Railway Company to open for the carriage of traffic that portion of its railway extending from its station at St. Denis Street, in St. Lambert, to town of Longueuill.

NEW INCORPORATIONS.

Hamilton, Ont.—Fearman Cold Storage and Warehousing Co., $100,000; R. C. Fearman, F. D. Fearman, F. C. Fearman. Shea's, $60,000; J. Shea, J. F. Shea, T. C. Howard.

Delhi, Ont.—Enterprise Gas Co., $100,000; H. H. Darby, S. Strout, G. E. Quance.

Montreal, Que.—Waterproof Products, $250,000; J. J. Robson, J. H. Brittle, C. R. Hazen. George B. Prowse Range Co., $50,000; C. C. Prowse, W. P. McVey, A. Mallette. Securities Syndicate, $50,000; V. E. Mitchell, J. W. Weldon, E. M. McDougall.

British Columbia.—Nelson Iron Works, $150,000.

MARKET CONDITIONS.

Following the quotations of the various articles listed in the markets will be found in brackets numbers, thus (10). These numbers refer to the list number of advertisers on page 3 of this issue and will assist the reader to quickly find the name and address of a firm handling any particular article. Buyers not able to secure articles from these firms at the prices mentioned will confer a favor by letting us know.

Montreal, May 31st, 1910.

Reports concerning the pig-iron market in the United States are to the effect that New Jersey is still the most active centre for buying. Foundry grades seem to be the most called for and several machinery and specialty foundries have also made important purchases. Later reports seem to be in every way more encouraging than those received earlier in the week, this being an encouraging sign. Bessemer pig-iron, it seems, has reached a new low level at Pittsburg, one furnace having sold some 5,000 tons for forward delivery at $16 at the furnace. It would seem that the market for basic iron has settled down for the time being, at $15 at the furnace. Foundry iron is slightly weaker, No. 2 being sold at $15, Valley furnace. It is worthy of note that very few consumers have covered their pig-iron requirements for the last half of the year, and they are watching the market closely. The feeling is that prices are somewhere around the bottom now, and that the market may turn at any time any considerable buying movement develops.

Bessemer steel billets and sheets have declined still further, but prices on open hearth steel are firm. Some very low prices have also been accepted on structural material. In fact, many think that manufacturers actually lost money on some orders they have taken.

The American Iron & Steel Association has just issued statistics of production in the United States during 1909. The production on all kinds of steel ingots and castings as compared with the previous two years is given below, in tons:—

	Bessemer.	Open Hearth.	Crucible and all other.	Total Ingots and Castings.
1909	9,330,783	14,493,936	130,302	23,955,021
1908	6,116,755	7,836,729	69,763	14,023,247
1907	11,667,549	11,549,736	145,309	23,362,594

It will be seen that the production in 1909 exceeded that of all previous years, 1907 having previously held the record.

Reports from different sources in England vary in tone, but the general feeling is more hopeful on the part of the makers, these being disposed to hold tightly to present prices or even to ask advances for future delivery. Second hands have, however, been caught with considerable stocks of dear iron, and rather than hold indefinitely for a rise have been offering to sell at a low level. This has naturally had a depressing effect. Shipments continue good and stocks in store are increasing but little. Hematite shows improvement in some localities, but has been almost entirely unchanged in others.

Locally, the market continues active with a good volume of business, but weakness prevailing in the United States centres has had a tendency of keeping some prospective buyers out of the market, they anticipating the possibility of being able to cover their requirements later on at somewhat lower prices. During the past few days, however, there has been news of a much better buying movement from the other side, and Canadian consumers are waking up to the necessity of arranging for their supplies promptly, if they are to obtain to-day's prices. The general feeling is that prices are around bottom, and it would not take very much to swing them up again.

Under the conditions described, the market for finished and semi-finished products continues unchanged.

Quotations are repeated as follows:—

Antimony.—The market is steady at 8c. to 8¼c. (111).

Bar Iron and Steel.—The market promises to advance shortly. Bar iron $1.90 per 100 pounds; best refined horseshoe, $2.15; forged iron, $2.05; mild steel, $1.90; sleigh shoe steel, $1.90 for 1 x ⅜-base; tire steel, $2.00 for 1 x ⅜-base; toe calk steel, $2.40; machine steel, iron finish, $1.95; imported, $2.20 (111, 119).

Building Paper.—Tar paper, 7, 10, or 16 ounces, $1.80 per 100 pounds; felt paper, $2.75 per 100 pounds; tar sheathing, 40c. per roll of 400 square feet; dry sheathing, No. 1, 30 to 40c. per roll of 400 square feet; tarred year will be the largest in the history of the country. Prices on foreign fibre, 55c. per roll; dry fibre, 45c. (See Roofing; also Tar and Pitch). (164).

Cement.—Canadian cement is quotable, as follows, in car lots, f.o.b., Montreal:—$1.30 to $1.40 per 350-lb. bbl., in 4 cotton bags, adding 10c. for each bag. Good bags re-purchased at 10c. each. Paper bags cost 2½ cents extra, or 10c. per bbl. weight. (26, 164).

Chain.—The market has advanced again, being now per 100 lbs., as follows:—¼-in., $5.30; 5-16-in., $4.70; ⅜-in., $3.90; 7-16-in., $3.65; ½-in., $3.55; 9-16-in., $3.45; ⅝-in., $3.40; ¾-in., $3.35; ⅞-in., $3.35; 1-in., $3.35.

Coal and Coke.—Anthracite, egg, stove or chestnut coal, $6.75 per ton, net; furnace coal, $6.50, net. Bituminous or soft coal: Run of mine, Nova Scotia coal, carload lots, basis, Montreal, $3.85 to $4 per ton; cannel coal, $9 per ton; coke, single ton, $5; large lots, special rates, approximately $4 f.o.b., cars, Montreal

Copper.—Prices are strong at 13¾ to 14c.

Explosives and Accessories.—Dynamite, 50-lb. cases, 40 per cent. proof, 15c. in single case lots, Montreal. Blasting powder, 25-lb. kegs, $2.25 per keg. Special quotations on large lots of dynamite and powder. Detonator caps, case lots, containing 10,000, 75c. per 100; broken lots, $1; electric blasting apparatus:—Batteries, 1 to 10 holes, $15; 1 to 20 holes, $25; 1 to 30 holes, $35; 1 to 40 holes, $50. Wire, leading, 1c. per foot; connecting, 50c. per lb. Fuses, platinum, single strength, per 100 fuses:—4-ft. wires, $3; 6-ft. wires, $3.54; 8-ft. wires, $4.08; 10-ft. wires, $5.

Galvanized Iron.—The market is steady. Prices, basis, 28-gauge, are:—Queen's Head, $4.10; Colborne Crown, $3.85; Apollo, 10¾ oz., $4.05. Add 25c. to above figures for less than case lots; 26-gauge is 25c. less than 28-gauge, American 28-gauge and English 26 are equivalents, as are American 10¾ oz., and English 28-gauge. (111).

Galvanized Pipe.—(See Pipe, Wrought and Galvanized).

Iron.—First boats are now arriving at Montreal, and importers are quoting prices, ex-wharf, about $1 per ton under prices ex-store. Following are the prices, on cars, ex-wharf, Montreal:—No. 1 Summerlee, $20.50 to $20.75 per ton; selected Summerlee, $20 to $20.25; soft Summerlee, $19.50 to $19.75; Carron, special, $20 to $20.50; soft, $19.50 to $20; Clarence, $17.25 to $17.50; Cleveland, $17.25 to $17.50 per ton.

Laths.—See Lumber, etc.

Lead.—Prices are easier, at $3.35 to $3.45.

Lead Wool.—$10.50 per hundred, $200 per ton, f.o.b., factory.

Lumber, Etc.—Prices on lumber are for car lots, to contractors, at mill points, carrying a freight of $1.50. Red pine, mill culls out, $18 to $22 per 1,000 feet; white pine, mill culls, $16 to $17. Spruce, 1-in. by 4-in. and up, $15 to $17 per 1,000 ft.; mill culls, $12 to $14. Hemlock, log run, culls out, $13 to $15. Railway Ties; Standard Railway Ties, hemlock or cedar, 35 to 45c. each, on a 5c. rate to Montreal. Telegraph Poles: Seven-inch top, cedar poles, 25-ft. poles, $1.35 to $1.50 each; 30-ft., $1.75 to $2; 35-ft., $2.75 to $3.25 each, at manufacturers' points, with 5c. freight rate to Montreal. Laths: Quotations per 1,000 laths, at points carring $1.50 freight rate to Montreal, $2 to $3. Shingles: Cedar shingles, same conditions as laths, X. $1.50; XX, 2.50; XXX, $3. (112)

Nails.—Demand for nails is better and prices are firmer, $2.40 per keg for cut, and $2.35 for wire, base prices. Wire roofing nails, 5c. lb.

Paints.—Roof, barn and fence paint, 90c. per gallon; girder, bridge, and structural paint for steel or iron—shop or field—$1.20 per gallon, in barrels; liquid red lead in gallon cans, $1.75 per gallon.

Pipe.Cast Iron.—The market shows a steady tone although demand is on the dull side. Prices are firm, and approximately as follows:—$32 for 6 and 8-inch pipe and larger; $33 for 3-inch and 4-inch at the foundry. Pipe, specials, $3 per 100 pounds. Gas pipe is quoted at about $1 more than the above. (74, 188).

Pipe.—Wrought and Galvanized.—Demand is about the same, and the tone is firm, though prices are steady, moderate-sized lots being: ¼-inch, $5.50 with 63 per cent. off for black, and 48 per cent. off for galvanized; ⅜-inch, $5.50, with 59 per cent. off for black and 44 per cent. off for galvanized; ½-inch, $8.50, with 69 per cent. off for black, and 59 per cent. off for galvanized. The discount on the following is 71½ per cent. off for black, and 61¾ per cent. off for galvanized; ¾-inch, $11.50; 1-inch, $16.50; 1¼-inch, $22.50; 1½-inch, $27; 2-inch, $36; 2½-inch, $57.50; 3-inch, $75.50; 3½-inch. $95; 4-inch, $108.

Plates and Sheets.—Steel.—The market is steady. Quotations are: $2.20 for 3-16; $2.30 for ⅛, and $2.10 for ¼ and thicker; 12-gauge being $2.30; 14-gauge, $2.15; and 16-gauge, $2.10. (111).

Rails.—Quotations on steel rails are necessarily only approximate and depend upon specification, quantity and delivery required. A range of rails, per gross ton of 2,240 lbs., f.o.b. mill. Re-laying rails are quoted at $27 to $29 per ton, according to condition of rail and location. (73).

Railway Ties.—See lumber, etc.

Roofing.—Ready roofing, two-ply, 70c. per roll; three-ply, 05c. per roll of 100 square feet. Roofing tin caps, 6c. lb.; wire roofing nails, 5c. lb. (See Building Paper; Tar and Pitch; Nails, Roofing). (164).

Rope.—Prices are steady, at 9c. per lb. for sisal, and 10½c. for Manila. Wire rope, crucible steel, six-strands, nineteen wires; ¼-in., $2.75; 5-16, $3.75; ⅜, $4.75; ½, $5.25; ⅝, $6.25; ¾, $8; ⅞, $10; 1-in., $12 per 100 feet. (132).

Spikes.—Railway spikes are firmer at $2.45 per 100 pounds, base of 5⅝ x 9-16. Ship spikes are steady at $2.85 per 100 pounds, base of 5/8 x 10-inch, and 5/8 x 12-inch. (132).

Steel Shafting.—Prices are steady at the list, less 25 per cent. Demand is on the dull side.

Telegraph Poles.—See lumber, etc.

Tar and Pitch.—Coal tar, $3.50 per barrel of 40 gallons, weighing about 500 pounds; roofing pitch, No. 1, 70c. per 100 pounds; and No. 2, 55c. per 100 pounds; pine tar, $8.50 per barrel of 40 gallons, and $4.75 per half-barrel; refined coal tar, $4.50 per barrel; pine pitch, $4 per barrel of 180 to 200 pounds. (See building paper; also roofing).

Tin.—Prices are firm, at $34 to $34.50.

Zinc.—The tone is easy, at 5¾ to 6c.

CAMP SUPPLIES.

Beans.—Prime pea beans, $2 to $2.25 per bushel. (74).

Butter.—Fresh made creamery, 25 to 26c.

Canned Goods.—Per Dozen.—Corn, 80 to 85; peas, $1.05 to $1.15; beans, 85c.; tomatoes, 85 to 90c.; peaches, 2s, $1.65, and 3s, $2.65; pears, 2s, $1.60, and 3s, $2.20; salmon, best brands, 1-lb. talls, $1.87½, and flats, $2.02½; cheaper grades, 95c. to $1.65. (74).

Cheese.—The market ranges from 11c. to 11½c., covering all Canadian makes.

Coffee.—Mocha, 20 to 25c.; Santos, 15 to 18c.; Rio, 10 to 12c. (74).

Dried Fruits.—Currants, Filiatras, 5¾ to 6¼c.; choice, 8 to 9c.; dates, 4 to 5c.; raisins, Valentias, 5 to 6¼c.; California, seeded, 7½ to 9c.; Evaporated apples, prime, 8 to 8½c. (74).

Eggs.—New laid, 20 to 22c. (74).

Flour.—Manitoba, 1st patents, $5.60 per barrel; 2nd patents, $5.10; strong bakers, $4.90. (74).

Molasses and Syrup.—Molasses, New Orleans, 27 to 28c.; Barbadoes, 40 to 45c.; Porto Rico, 40 to 43c.; syrup, barrels, 3½c.; 2-lb. tins, 2 dozen to case, $2.50 per case. (74).

Potatoes.—Per 90 lbs., good quality, 45 to 50c. (74).

Rice and Tapioca.—Rice, grade B., in 100-lb. bags, $2.75 to $2.80; C.C., $2.65. Tapioca, medium pearl, 5½ to 6c. (74).

Rolled Oats.—Oatmeal. $2.20 per bag; rolled oats, $2, bags. (74).

Sugar.—Granulated, bags, $5.05; yellow, $4.65 to $5. Barrels 5c. above bag prices.

Tea.—Japans, 20 to 38c.; Ceylons, 20 to 40c.; Ceylon, greens, 19 to 25c.; China, green, 20 to 50c.; low-grades, down to 15c. (74).

Fish.—Salted.—Medium cod, $7 per bbl.; herring, $5.25 per bbl.; salmon, $15.50 per bbl., for red, and $14 for pink. Smoked fish.—Bloaters, $1.10